



wwPDB EM Validation Summary Report ⓘ

Mar 12, 2026 – 12:23 PM UTC

PDB ID : 8X0K / pdb_00008x0k
EMDB ID : EMD-37980
Title : Cryo-EM structure of Semliki Forest virus in complex with its receptor
VLDLR(2-fold)
Authors : Gao, F.G.; Liu, S.
Deposited on : 2023-11-04
Resolution : 3.50 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

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A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

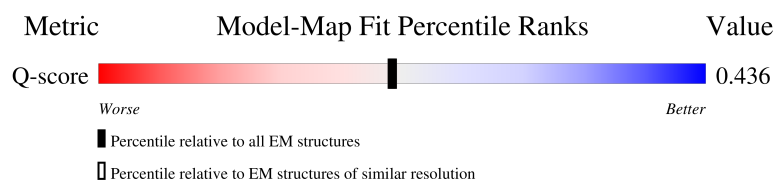
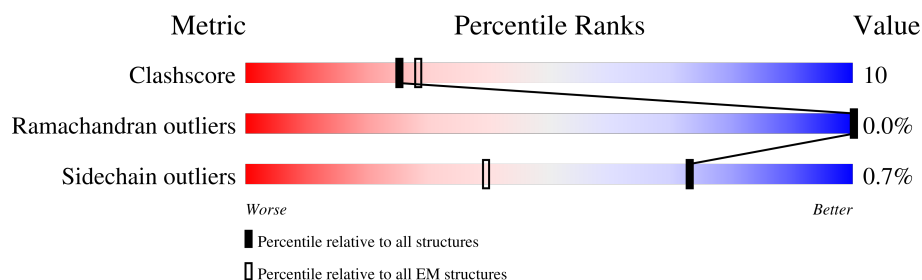
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.50 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



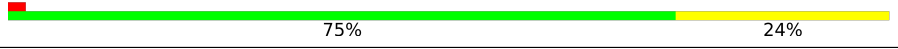
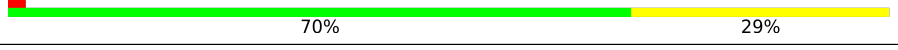
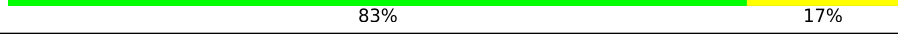
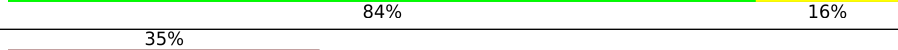
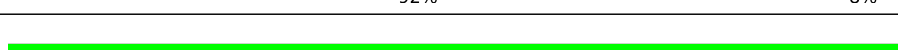
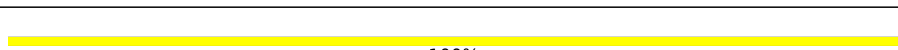
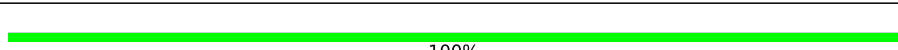
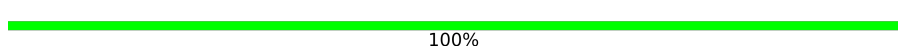
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	13950 (3.00 - 4.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	162	6% 65% 35% .
1	E	162	12% 62% 37% .
1	I	162	16% 61% 39% .
1	M	162	6% 63% 36% .

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Mol	Chain	Length	Quality of chain
2	B	418	
2	F	418	
2	J	418	
2	N	418	
3	C	438	
3	G	438	
3	K	438	
3	O	438	
4	D	37	
4	H	37	
4	L	37	
4	P	37	
5	Q	2	
5	R	2	
5	S	2	
5	T	2	
5	U	2	
5	V	2	
5	W	2	
5	X	2	

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 32740 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	162	Total	C	N	O	S	0	0
			1249	781	227	232	9		
1	E	162	Total	C	N	O	S	0	0
			1249	781	227	232	9		
1	I	162	Total	C	N	O	S	0	0
			1249	781	227	232	9		
1	M	162	Total	C	N	O	S	0	0
			1249	781	227	232	9		

- Molecule 2 is a protein called Spike glycoprotein E2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	418	Total	C	N	O	S	0	0
			3256	2056	575	600	25		
2	F	418	Total	C	N	O	S	0	0
			3256	2056	575	600	25		
2	J	418	Total	C	N	O	S	0	0
			3256	2056	575	600	25		
2	N	418	Total	C	N	O	S	0	0
			3256	2056	575	600	25		

- Molecule 3 is a protein called Spike glycoprotein E1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	438	Total	C	N	O	S	0	0
			3329	2109	559	636	25		
3	G	438	Total	C	N	O	S	0	0
			3329	2109	559	636	25		
3	K	438	Total	C	N	O	S	0	0
			3329	2109	559	636	25		
3	O	438	Total	C	N	O	S	0	0
			3329	2109	559	636	25		

- Molecule 4 is a protein called Very low-density lipoprotein receptor.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	37	Total	C	N	O	S	0	0
			280	160	51	63	6		
4	H	37	Total	C	N	O	S	0	0
			280	160	51	63	6		
4	L	37	Total	C	N	O	S	0	0
			280	160	51	63	6		
4	P	37	Total	C	N	O	S	0	0
			280	160	51	63	6		

- Molecule 5 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace
5	Q	2	Total	C	N	O	0	0
			28	16	2	10		
5	R	2	Total	C	N	O	0	0
			28	16	2	10		
5	S	2	Total	C	N	O	0	0
			28	16	2	10		
5	T	2	Total	C	N	O	0	0
			28	16	2	10		
5	U	2	Total	C	N	O	0	0
			28	16	2	10		
5	V	2	Total	C	N	O	0	0
			28	16	2	10		
5	W	2	Total	C	N	O	0	0
			28	16	2	10		
5	X	2	Total	C	N	O	0	0
			28	16	2	10		

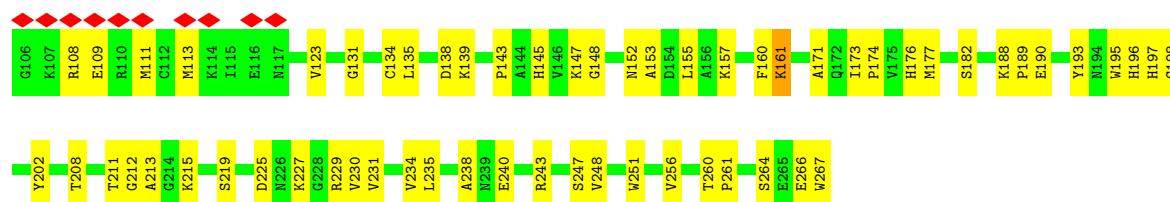
- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆) (labeled as "Ligand of Interest" by depositor).



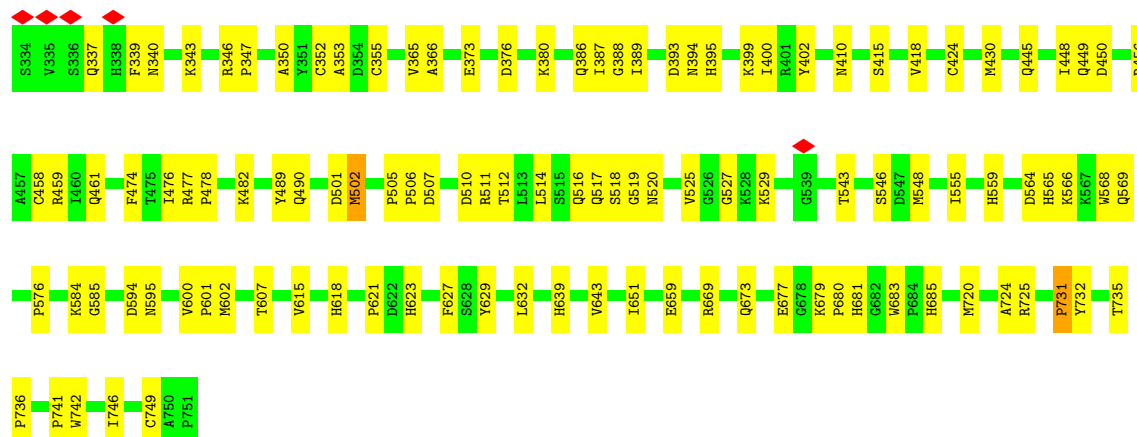
Mol	Chain	Residues	Atoms				AltConf
6	C	1	Total	C	N	O	0
			14	8	1	5	
6	G	1	Total	C	N	O	0
			14	8	1	5	
6	K	1	Total	C	N	O	0
			14	8	1	5	
6	O	1	Total	C	N	O	0
			14	8	1	5	

- Molecule 7 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

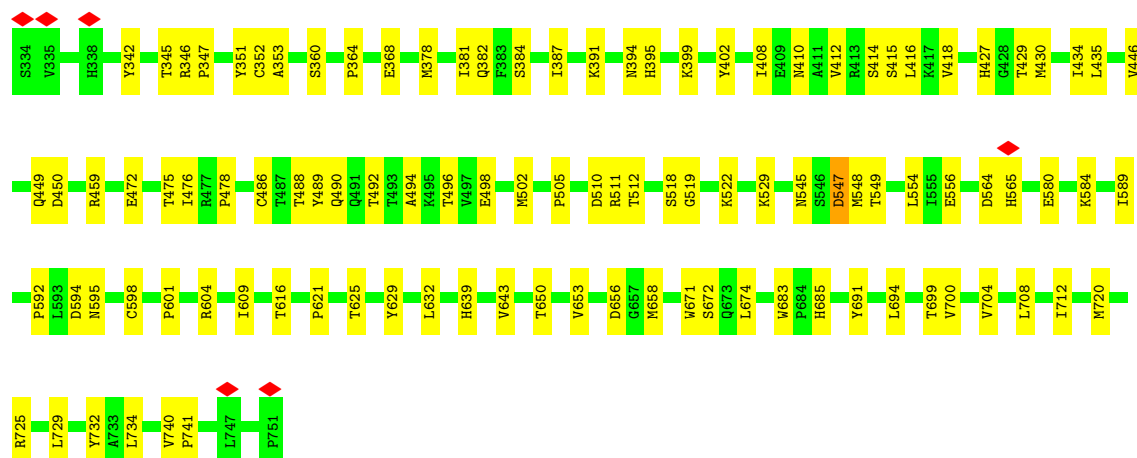
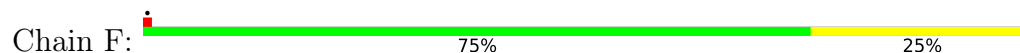
Mol	Chain	Residues	Atoms		AltConf
7	D	1	Total	Ca	0
			1	1	
7	H	1	Total	Ca	0
			1	1	
7	L	1	Total	Ca	0
			1	1	
7	P	1	Total	Ca	0
			1	1	



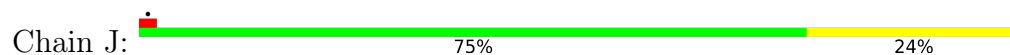
• Molecule 2: Spike glycoprotein E2

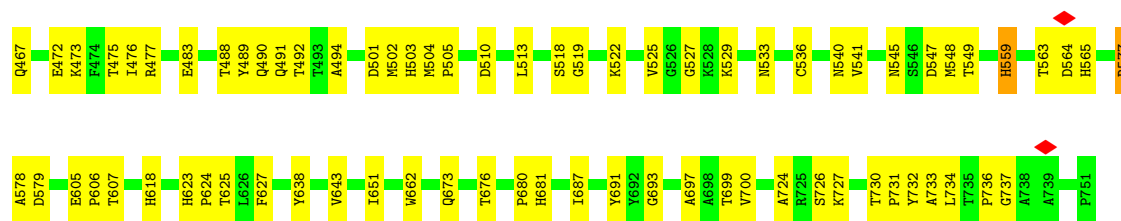


• Molecule 2: Spike glycoprotein E2



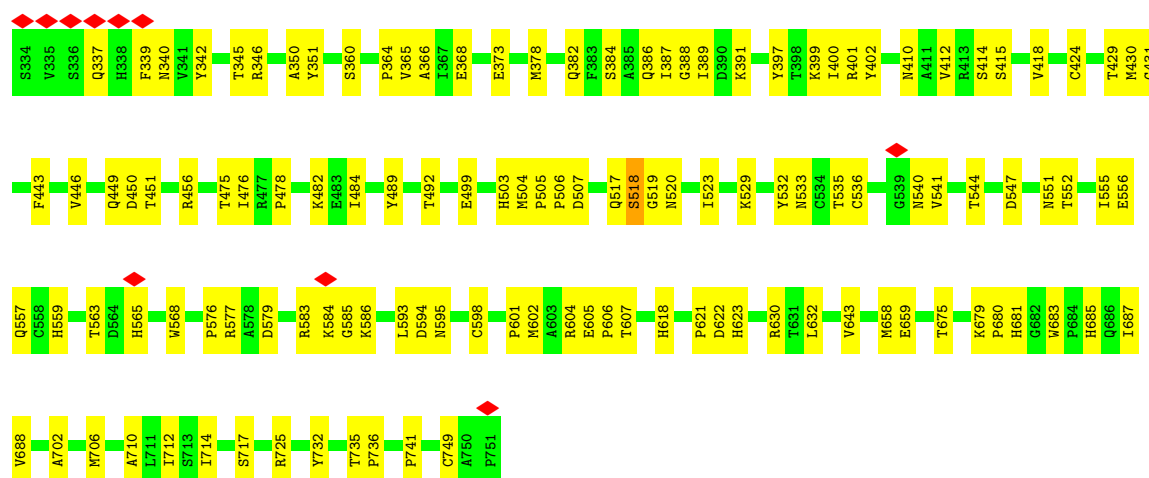
• Molecule 2: Spike glycoprotein E2





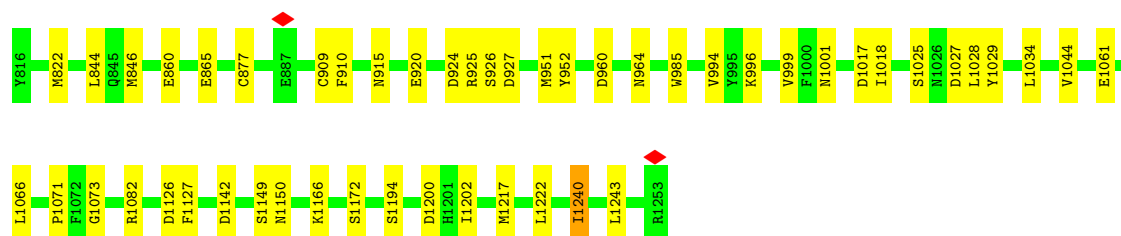
• Molecule 2: Spike glycoprotein E2

Chain N: 70% 29%



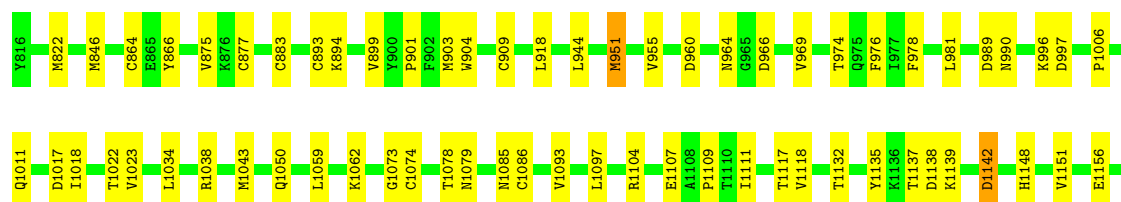
• Molecule 3: Spike glycoprotein E1

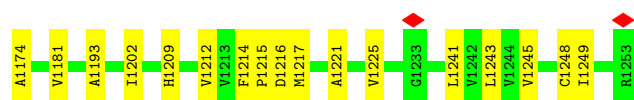
Chain C: 89% 11%



• Molecule 3: Spike glycoprotein E1

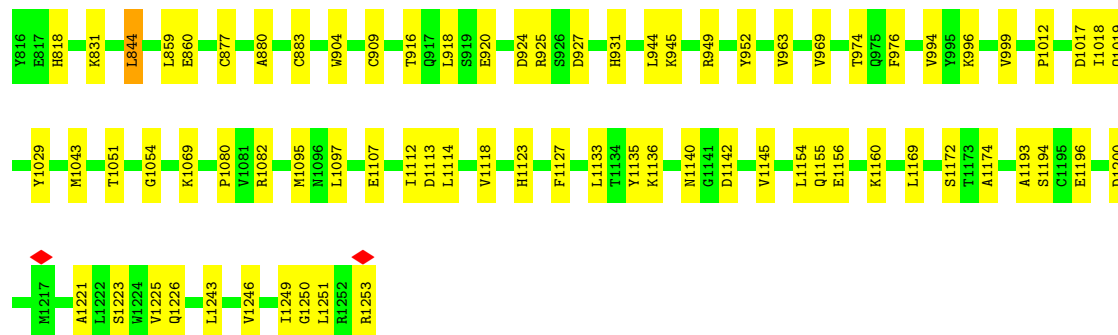
Chain G: 81% 18%





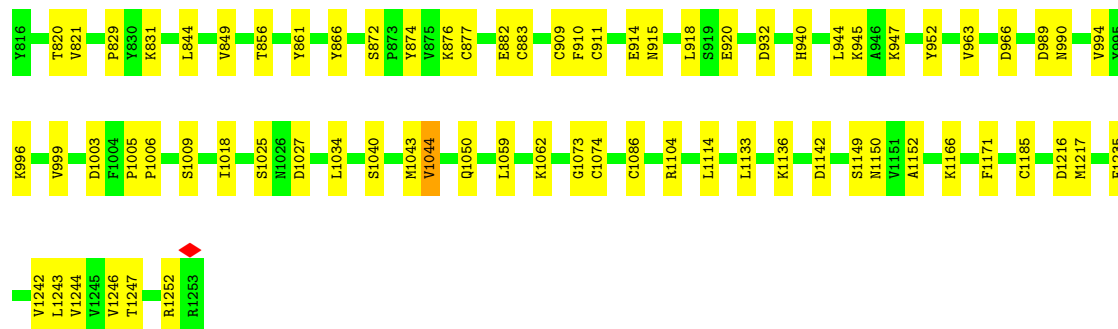
- Molecule 3: Spike glycoprotein E1

Chain K: 83% 17%



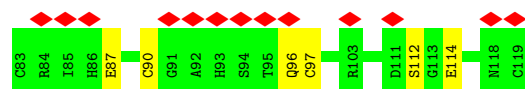
- Molecule 3: Spike glycoprotein E1

Chain O: 84% 16%



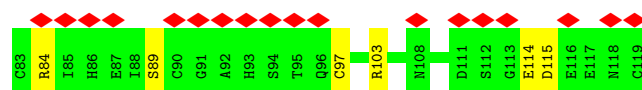
- Molecule 4: Very low-density lipoprotein receptor

Chain D: 35% 84% 16%

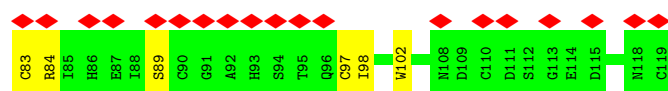
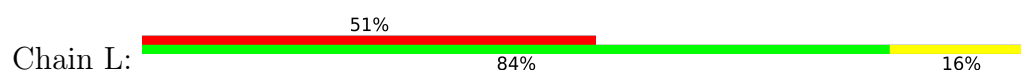


- Molecule 4: Very low-density lipoprotein receptor

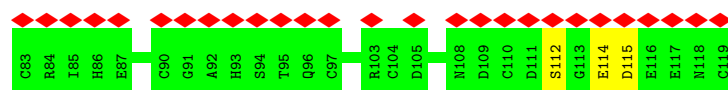
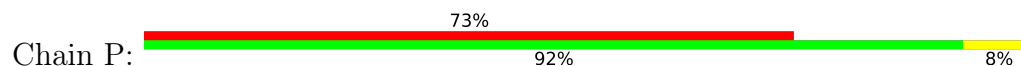
Chain H: 49% 84% 16%



- Molecule 4: Very low-density lipoprotein receptor



- Molecule 4: Very low-density lipoprotein receptor



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose





- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain V:  50% 50%



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain W:  100%



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain X:  50% 50%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	787942	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	1.25	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	5000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	2.112	Depositor
Minimum map value	-0.002	Depositor
Average map value	0.008	Depositor
Map value standard deviation	0.068	Depositor
Recommended contour level	0.1	Depositor
Map size ($\text{\AA}$)	404.80002, 404.80002, 404.80002	wwPDB
Map dimensions	368, 368, 368	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.1, 1.1, 1.1	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, CA

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.20	0/1277	0.51	1/1719 (0.1%)
1	E	0.16	0/1277	0.46	1/1719 (0.1%)
1	I	0.18	0/1277	0.44	0/1719
1	M	0.18	0/1277	0.42	0/1719
2	B	0.19	0/3349	0.43	1/4569 (0.0%)
2	F	0.18	0/3349	0.38	0/4569
2	J	0.18	0/3349	0.46	2/4569 (0.0%)
2	N	0.19	0/3349	0.44	1/4569 (0.0%)
3	C	0.18	0/3415	0.34	0/4660
3	G	0.17	0/3415	0.34	0/4660
3	K	0.17	0/3415	0.35	0/4660
3	O	0.17	0/3415	0.34	0/4660
4	D	0.10	0/284	0.24	0/383
4	H	0.11	0/284	0.27	0/383
4	L	0.08	0/284	0.21	0/383
4	P	0.08	0/284	0.20	0/383
All	All	0.18	0/33300	0.40	6/45324 (0.0%)

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	143	PRO	CA-N-CD	-10.64	97.10	112.00
2	B	731	PRO	CA-N-CD	-6.82	102.45	112.00
2	J	503	HIS	CA-C-N	6.14	129.80	121.20
2	J	503	HIS	C-N-CA	6.14	129.80	121.20
2	N	529	LYS	CA-CB-CG	5.85	125.80	114.10

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1249	0	1232	42	0
1	E	1249	0	1232	45	0
1	I	1249	0	1232	50	0
1	M	1249	0	1232	44	0
2	B	3256	0	3165	83	0
2	F	3256	0	3165	70	0
2	J	3256	0	3165	75	0
2	N	3256	0	3164	91	0
3	C	3329	0	3242	38	0
3	G	3329	0	3242	56	0
3	K	3329	0	3242	55	0
3	O	3329	0	3242	52	0
4	D	280	0	229	3	0
4	H	280	0	229	4	0
4	L	280	0	229	5	0
4	P	280	0	229	2	0
5	Q	28	0	25	0	0
5	R	28	0	25	1	0
5	S	28	0	25	1	0
5	T	28	0	25	0	0
5	U	28	0	25	1	0
5	V	28	0	25	2	0
5	W	28	0	25	0	0
5	X	28	0	25	1	0
6	C	14	0	13	1	0
6	G	14	0	13	2	0
6	K	14	0	13	0	0
6	O	14	0	13	0	0
7	D	1	0	0	0	0
7	H	1	0	0	0	0
7	L	1	0	0	0	0
7	P	1	0	0	0	0
All	All	32740	0	31723	668	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 10.

The worst 5 of 668 close contacts within the same asymmetric unit are listed below, sorted by

their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:165:LYS:HZ3	1:I:166:TYR:HE2	1.13	0.90
2:B:720:MET:HE1	3:C:1240:ILE:HD13	1.56	0.88
1:A:234:VAL:HA	1:A:248:VAL:HG12	1.59	0.83
2:F:346:ARG:HH12	2:F:505:PRO:HG3	1.45	0.81
2:J:430:MET:HA	2:J:430:MET:HE2	1.65	0.79

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	160/162 (99%)	152 (95%)	8 (5%)	0	100	100
1	E	160/162 (99%)	147 (92%)	13 (8%)	0	100	100
1	I	160/162 (99%)	150 (94%)	10 (6%)	0	100	100
1	M	160/162 (99%)	147 (92%)	13 (8%)	0	100	100
2	B	416/418 (100%)	392 (94%)	24 (6%)	0	100	100
2	F	416/418 (100%)	393 (94%)	23 (6%)	0	100	100
2	J	416/418 (100%)	397 (95%)	19 (5%)	0	100	100
2	N	416/418 (100%)	395 (95%)	20 (5%)	1 (0%)	43	74
3	C	436/438 (100%)	424 (97%)	12 (3%)	0	100	100
3	G	436/438 (100%)	421 (97%)	15 (3%)	0	100	100
3	K	436/438 (100%)	429 (98%)	7 (2%)	0	100	100
3	O	436/438 (100%)	425 (98%)	10 (2%)	1 (0%)	43	74
4	D	35/37 (95%)	33 (94%)	2 (6%)	0	100	100
4	H	35/37 (95%)	35 (100%)	0	0	100	100
4	L	35/37 (95%)	35 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	P	35/37 (95%)	35 (100%)	0	0	100	100
All	All	4188/4220 (99%)	4010 (96%)	176 (4%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	N	518	SER
3	O	1185	CYS

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	132/132 (100%)	131 (99%)	1 (1%)	73	77
1	E	132/132 (100%)	132 (100%)	0	100	100
1	I	132/132 (100%)	131 (99%)	1 (1%)	73	77
1	M	132/132 (100%)	129 (98%)	3 (2%)	44	64
2	B	358/358 (100%)	356 (99%)	2 (1%)	78	79
2	F	358/358 (100%)	356 (99%)	2 (1%)	78	79
2	J	358/358 (100%)	356 (99%)	2 (1%)	78	79
2	N	358/358 (100%)	353 (99%)	5 (1%)	59	71
3	C	372/372 (100%)	371 (100%)	1 (0%)	86	83
3	G	372/372 (100%)	369 (99%)	3 (1%)	73	77
3	K	372/372 (100%)	369 (99%)	3 (1%)	73	77
3	O	372/372 (100%)	371 (100%)	1 (0%)	86	83
4	D	33/33 (100%)	33 (100%)	0	100	100
4	H	33/33 (100%)	33 (100%)	0	100	100
4	L	33/33 (100%)	33 (100%)	0	100	100
4	P	33/33 (100%)	33 (100%)	0	100	100
All	All	3580/3580 (100%)	3556 (99%)	24 (1%)	73	78

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	K	1196	GLU
1	M	231	VAL
1	M	215	LYS
2	N	492	THR
3	G	875	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 31 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	176	HIS
3	O	818	HIS
2	J	340	ASN
3	O	1155	GLN
2	N	410	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

16 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	NAG	Q	1	2,5	14,14,15	0.28	0	17,19,21	0.44	0
5	NAG	Q	2	5	14,14,15	0.16	0	17,19,21	0.47	0
5	NAG	R	1	2,5	14,14,15	0.29	0	17,19,21	0.49	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	R	2	5	14,14,15	0.27	0	17,19,21	0.45	0
5	NAG	S	1	2,5	14,14,15	0.27	0	17,19,21	0.46	0
5	NAG	S	2	5	14,14,15	0.18	0	17,19,21	0.49	0
5	NAG	T	1	2,5	14,14,15	0.50	0	17,19,21	0.63	0
5	NAG	T	2	5	14,14,15	0.24	0	17,19,21	0.45	0
5	NAG	U	1	2,5	14,14,15	0.24	0	17,19,21	0.42	0
5	NAG	U	2	5	14,14,15	0.19	0	17,19,21	0.45	0
5	NAG	V	1	2,5	14,14,15	0.37	0	17,19,21	0.76	1 (5%)
5	NAG	V	2	5	14,14,15	0.25	0	17,19,21	0.41	0
5	NAG	W	1	2,5	14,14,15	0.22	0	17,19,21	0.40	0
5	NAG	W	2	5	14,14,15	0.19	0	17,19,21	0.46	0
5	NAG	X	1	2,5	14,14,15	0.30	0	17,19,21	0.54	0
5	NAG	X	2	5	14,14,15	0.27	0	17,19,21	0.47	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	Q	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	Q	2	5	-	2/6/23/26	0/1/1/1
5	NAG	R	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	R	2	5	-	2/6/23/26	0/1/1/1
5	NAG	S	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	S	2	5	-	2/6/23/26	0/1/1/1
5	NAG	T	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	T	2	5	-	2/6/23/26	0/1/1/1
5	NAG	U	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	U	2	5	-	2/6/23/26	0/1/1/1
5	NAG	V	1	2,5	-	1/6/23/26	0/1/1/1
5	NAG	V	2	5	-	2/6/23/26	0/1/1/1
5	NAG	W	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	W	2	5	-	2/6/23/26	0/1/1/1
5	NAG	X	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	X	2	5	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	V	1	NAG	C1-O5-C5	2.51	115.55	112.19

There are no chirality outliers.

5 of 31 torsion outliers are listed below:

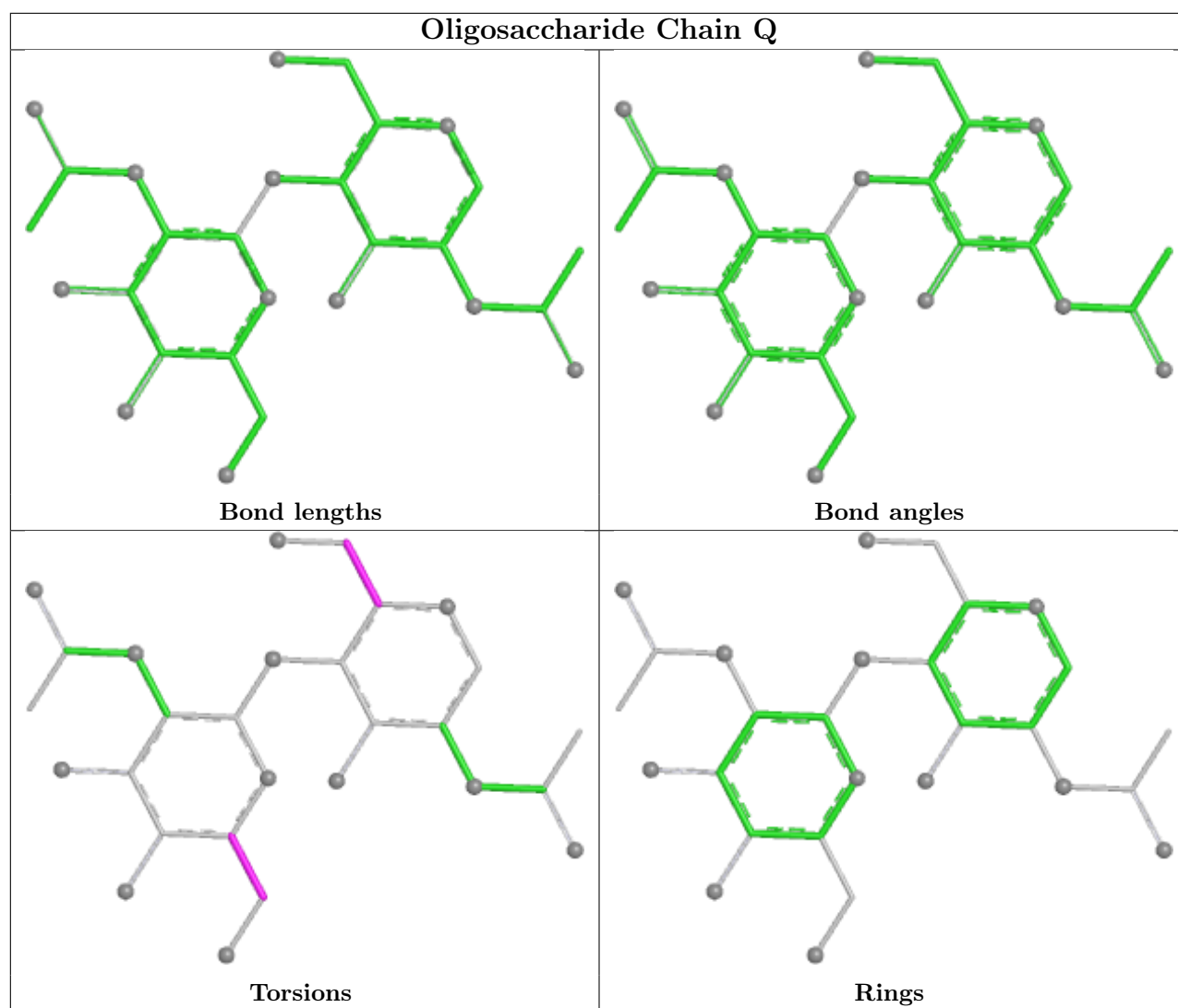
Mol	Chain	Res	Type	Atoms
5	S	2	NAG	C4-C5-C6-O6
5	Q	2	NAG	O5-C5-C6-O6
5	W	2	NAG	O5-C5-C6-O6
5	T	2	NAG	O5-C5-C6-O6
5	W	1	NAG	O5-C5-C6-O6

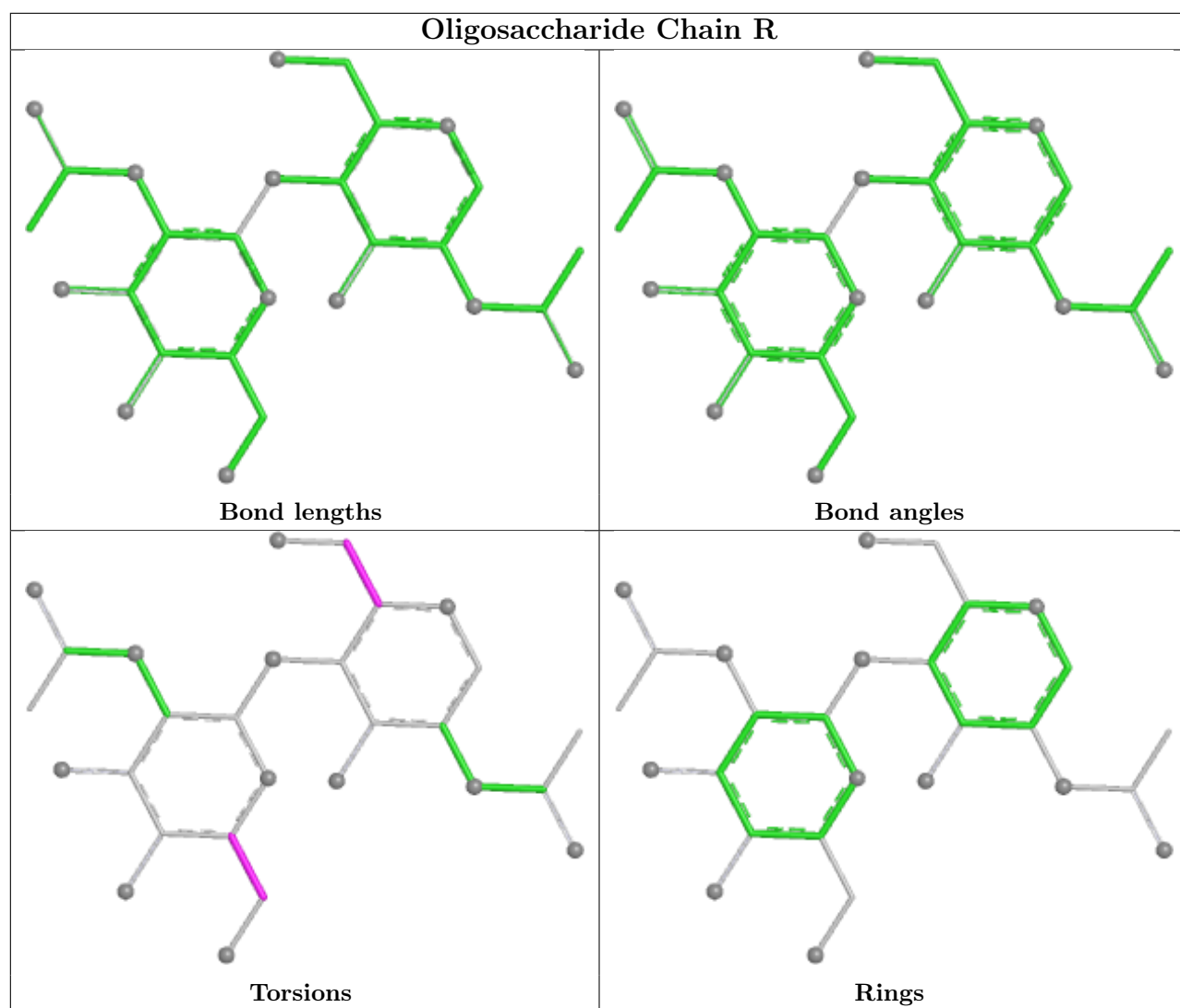
There are no ring outliers.

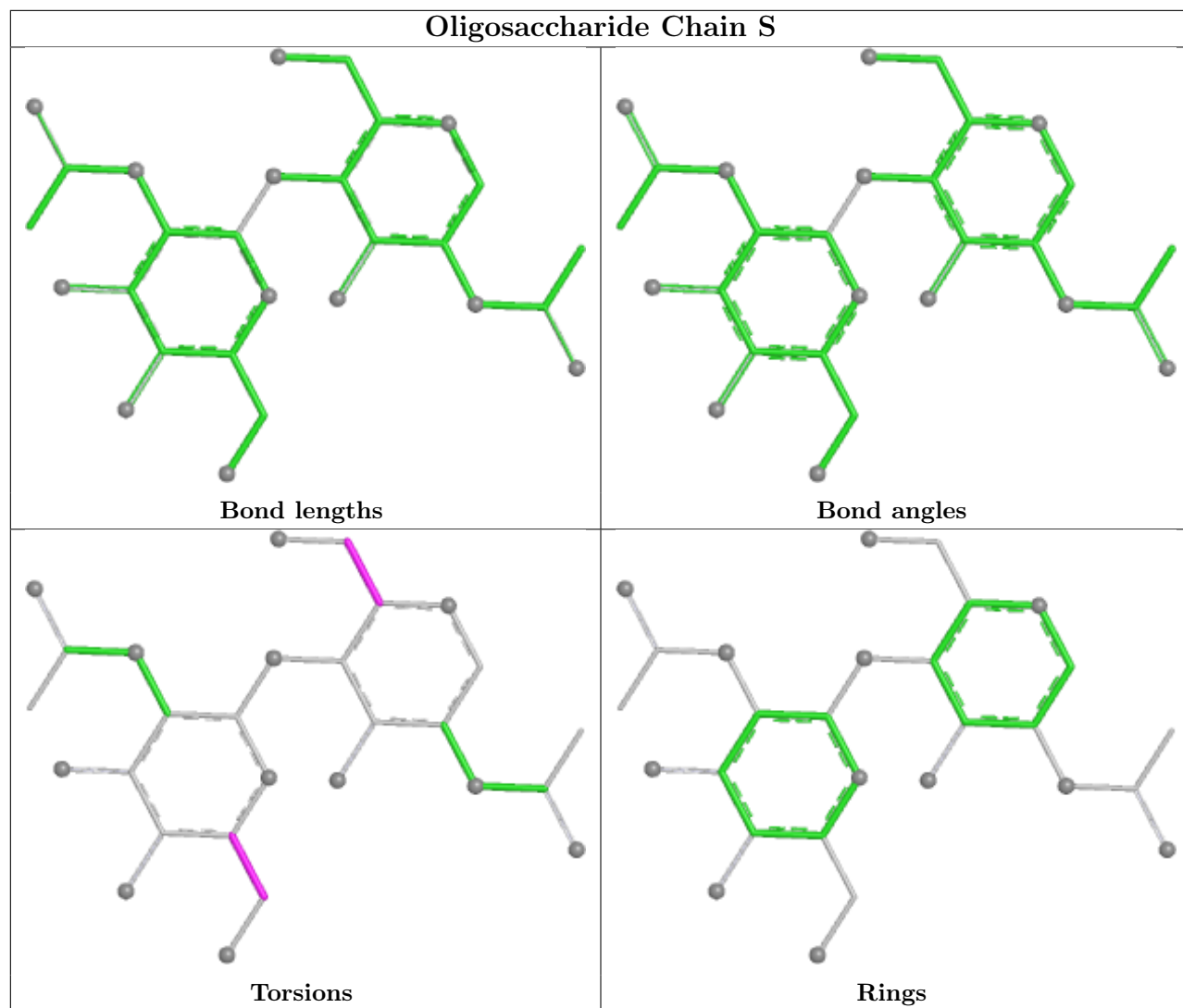
6 monomers are involved in 6 short contacts:

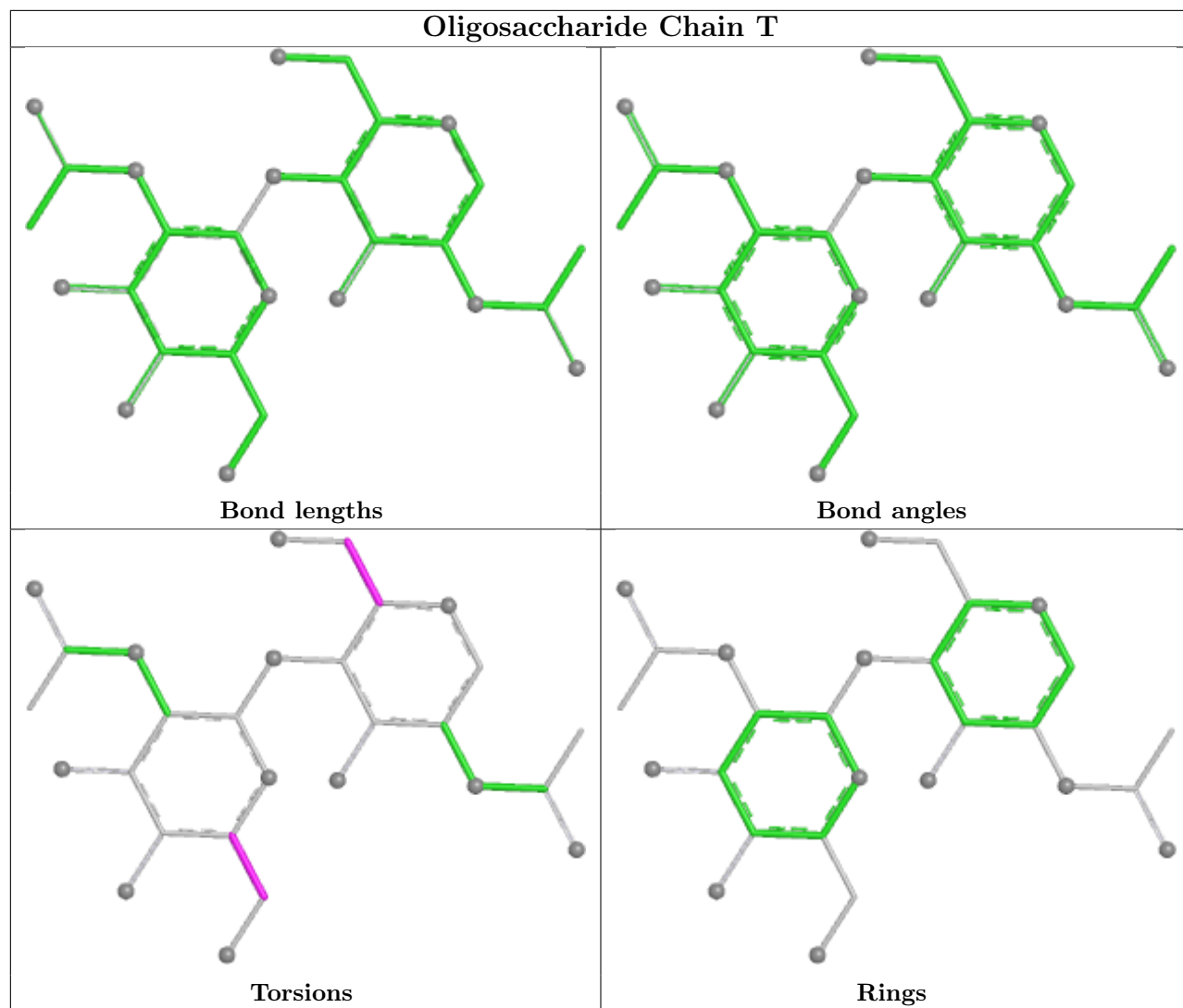
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	R	1	NAG	1	0
5	S	1	NAG	1	0
5	U	1	NAG	1	0
5	V	1	NAG	2	0
5	X	1	NAG	1	0
5	S	2	NAG	1	0

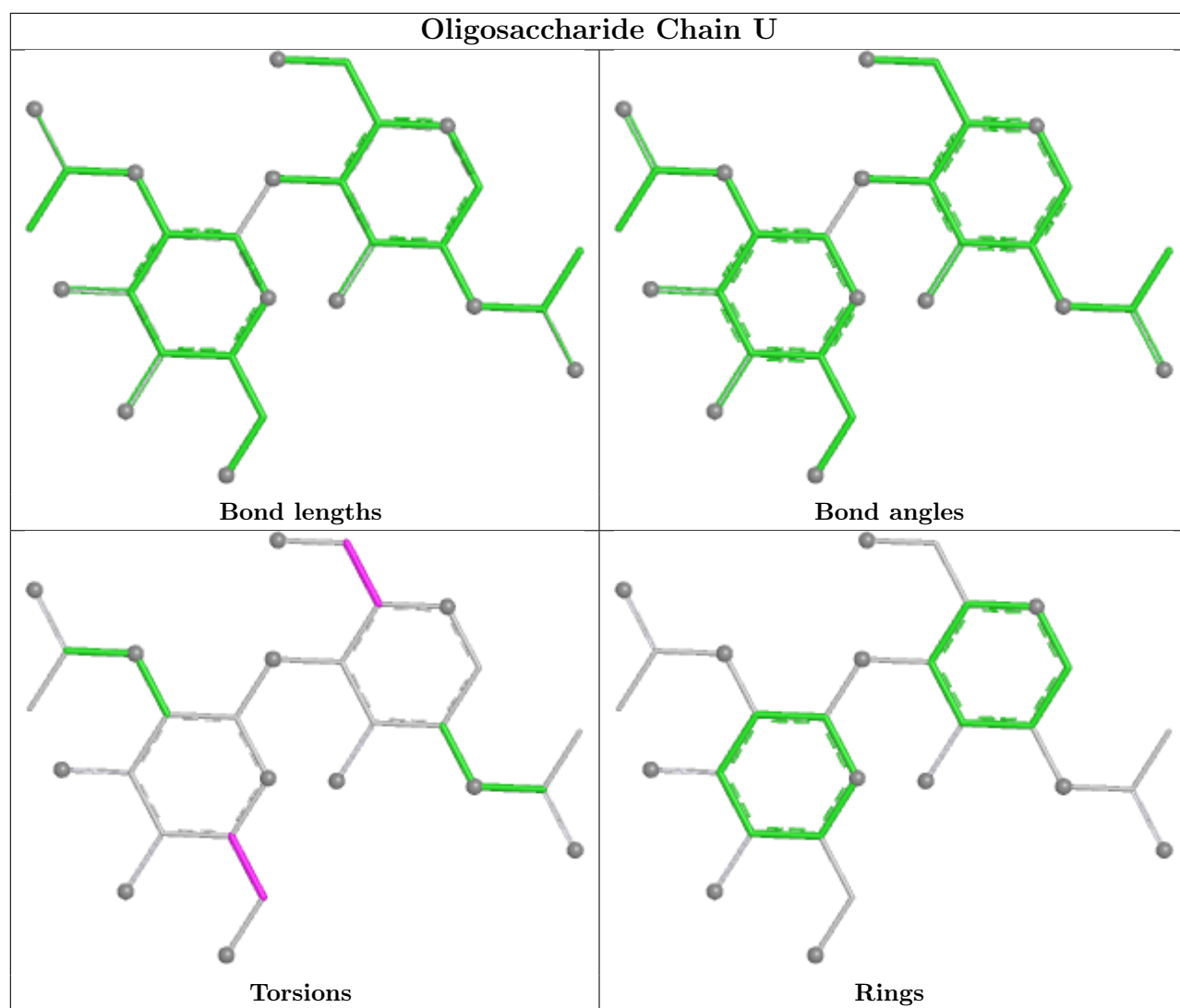
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

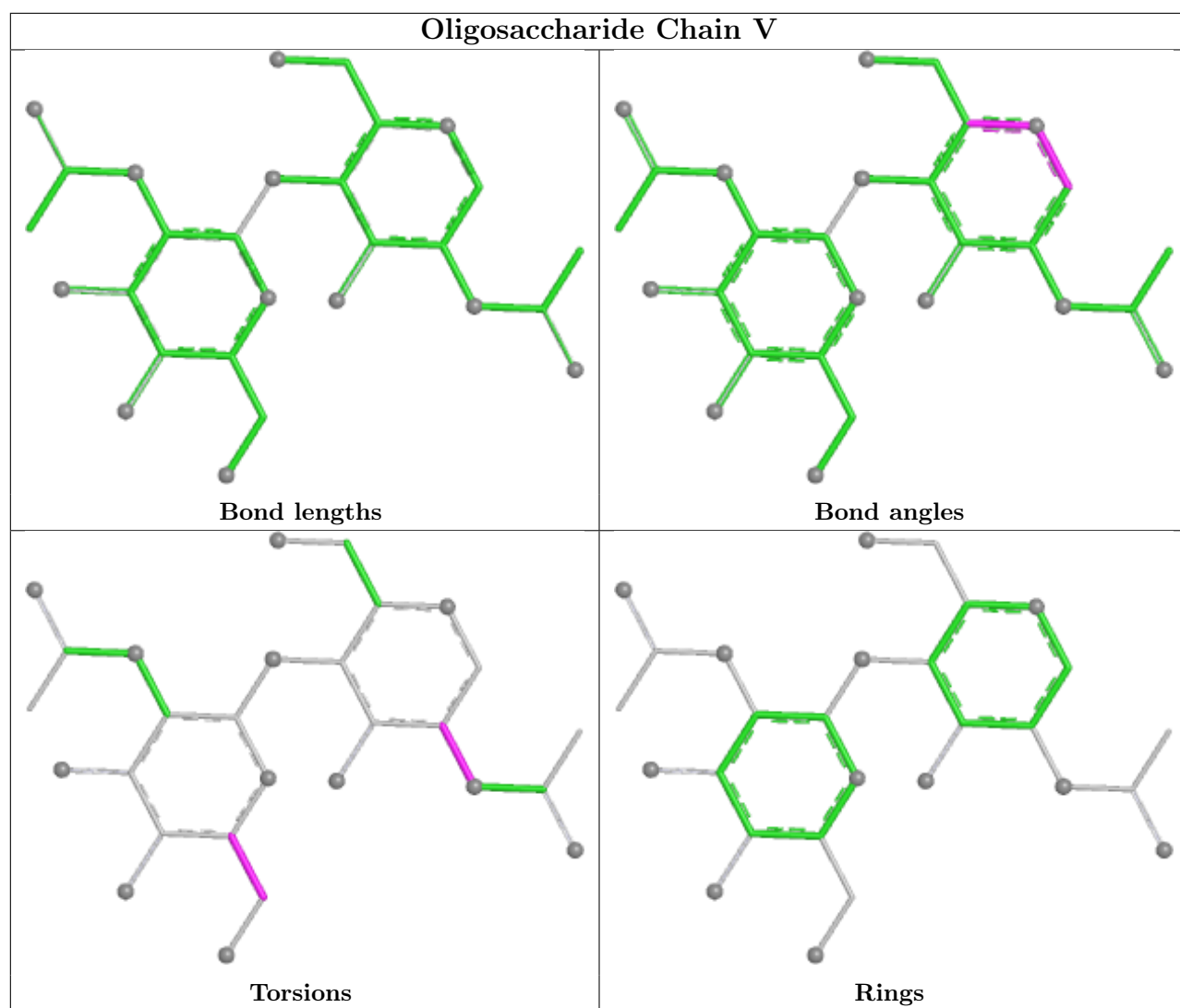


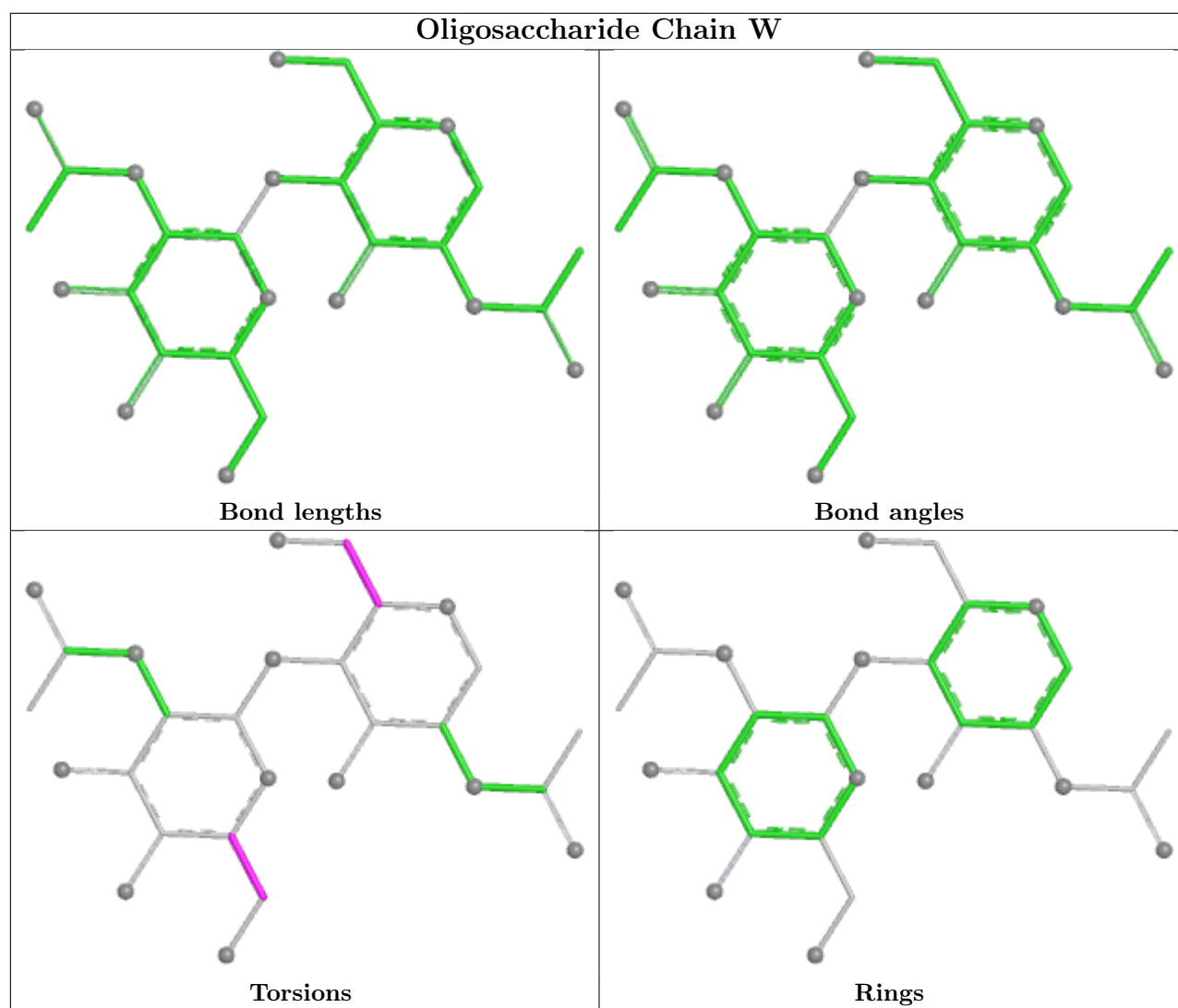


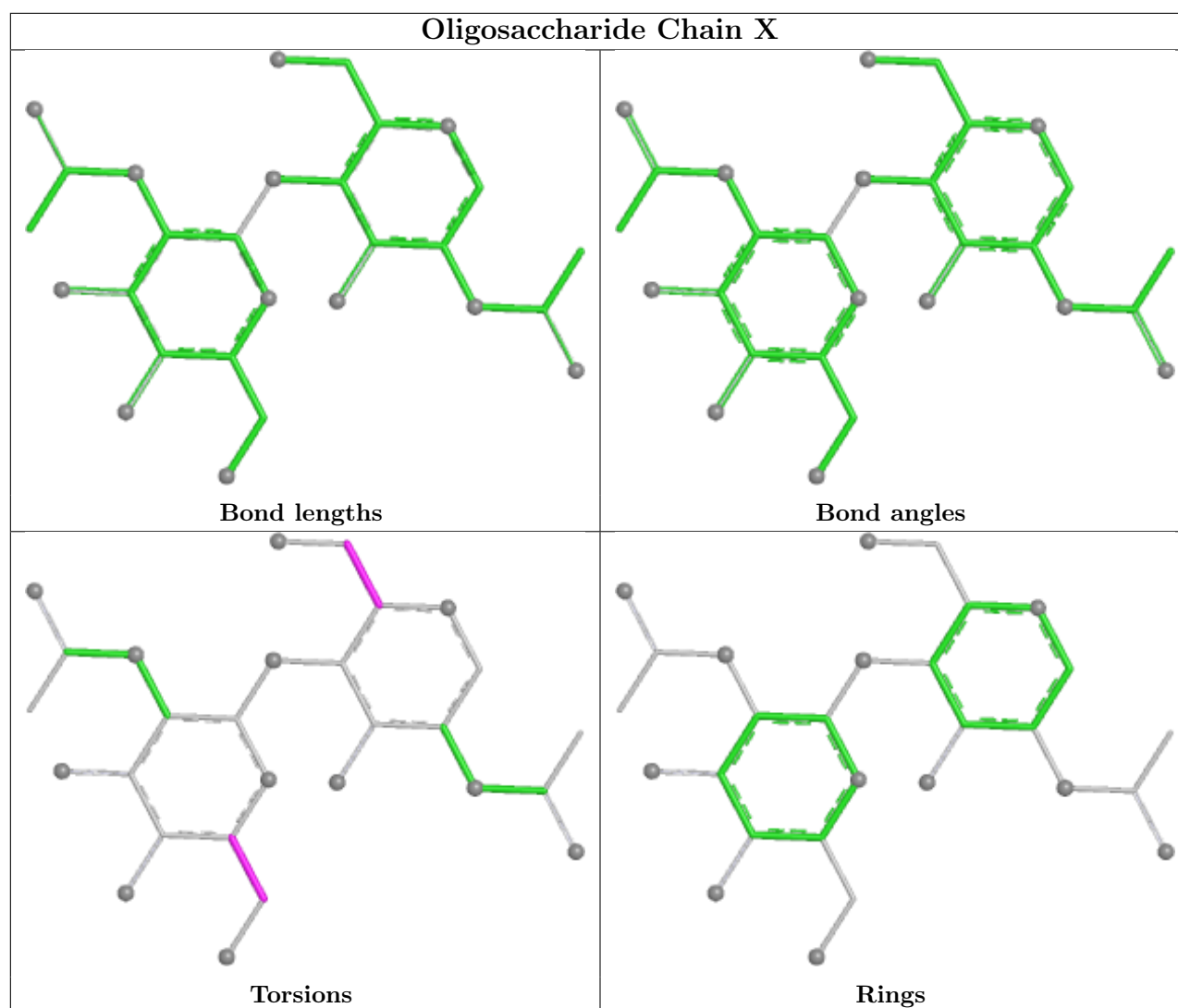












5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
6	NAG	O	1701	3	14,14,15	0.16	0	17,19,21	0.48	0
6	NAG	K	1701	3	14,14,15	0.23	0	17,19,21	0.53	0
6	NAG	G	1701	3	14,14,15	0.30	0	17,19,21	0.70	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
6	NAG	C	1701	3	14,14,15	0.17	0	17,19,21	0.58	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	NAG	O	1701	3	-	2/6/23/26	0/1/1/1
6	NAG	K	1701	3	-	2/6/23/26	0/1/1/1
6	NAG	G	1701	3	-	0/6/23/26	0/1/1/1
6	NAG	C	1701	3	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	G	1701	NAG	C1-O5-C5	2.47	115.50	112.19

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	K	1701	NAG	C4-C5-C6-O6
6	O	1701	NAG	C4-C5-C6-O6
6	K	1701	NAG	O5-C5-C6-O6
6	O	1701	NAG	O5-C5-C6-O6

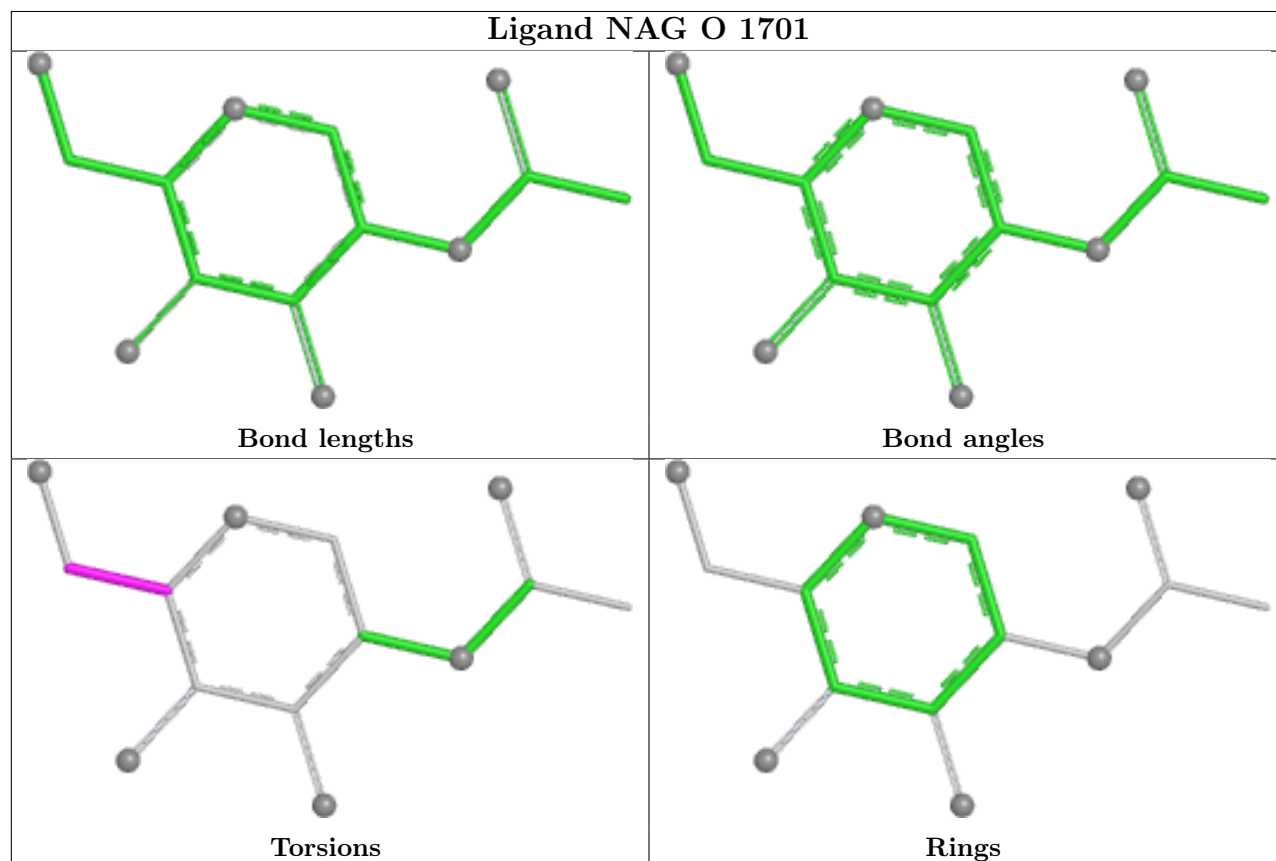
There are no ring outliers.

2 monomers are involved in 3 short contacts:

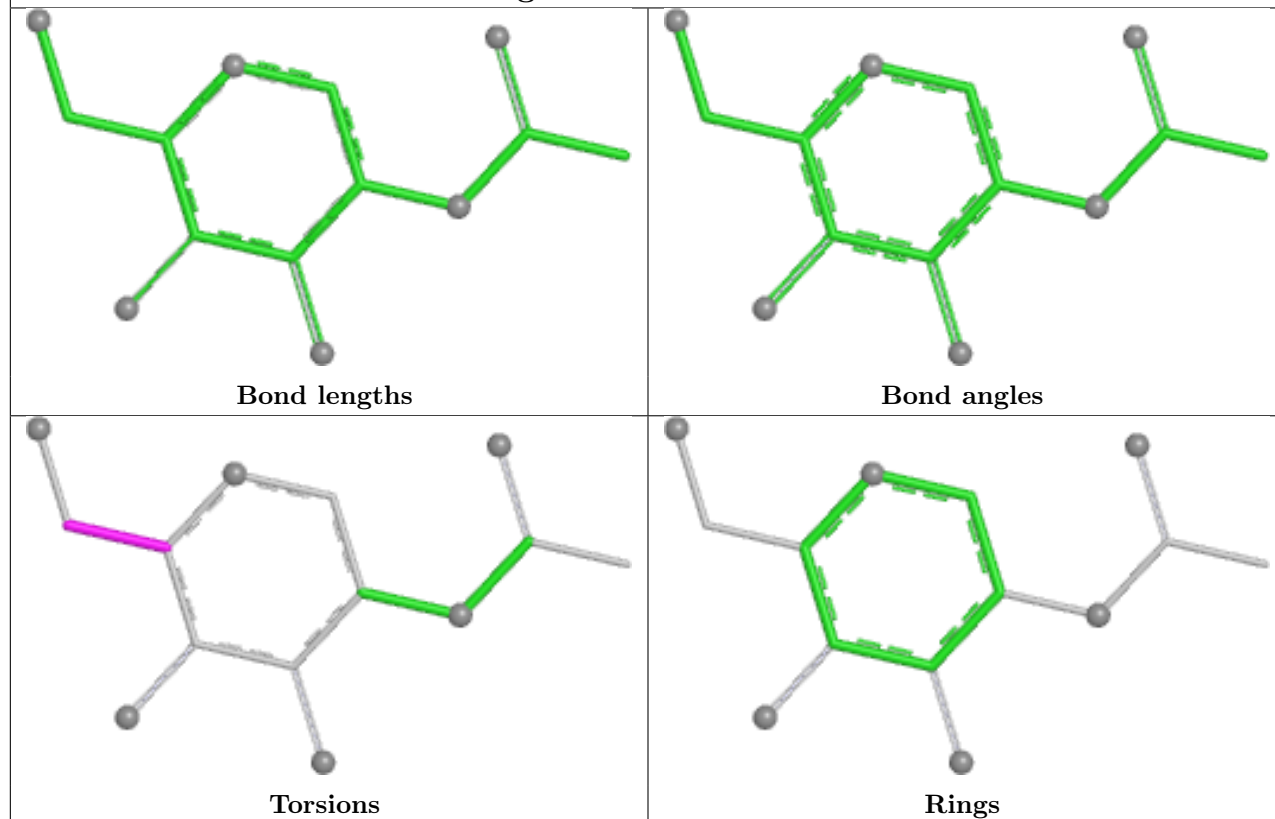
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	G	1701	NAG	2	0
6	C	1701	NAG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

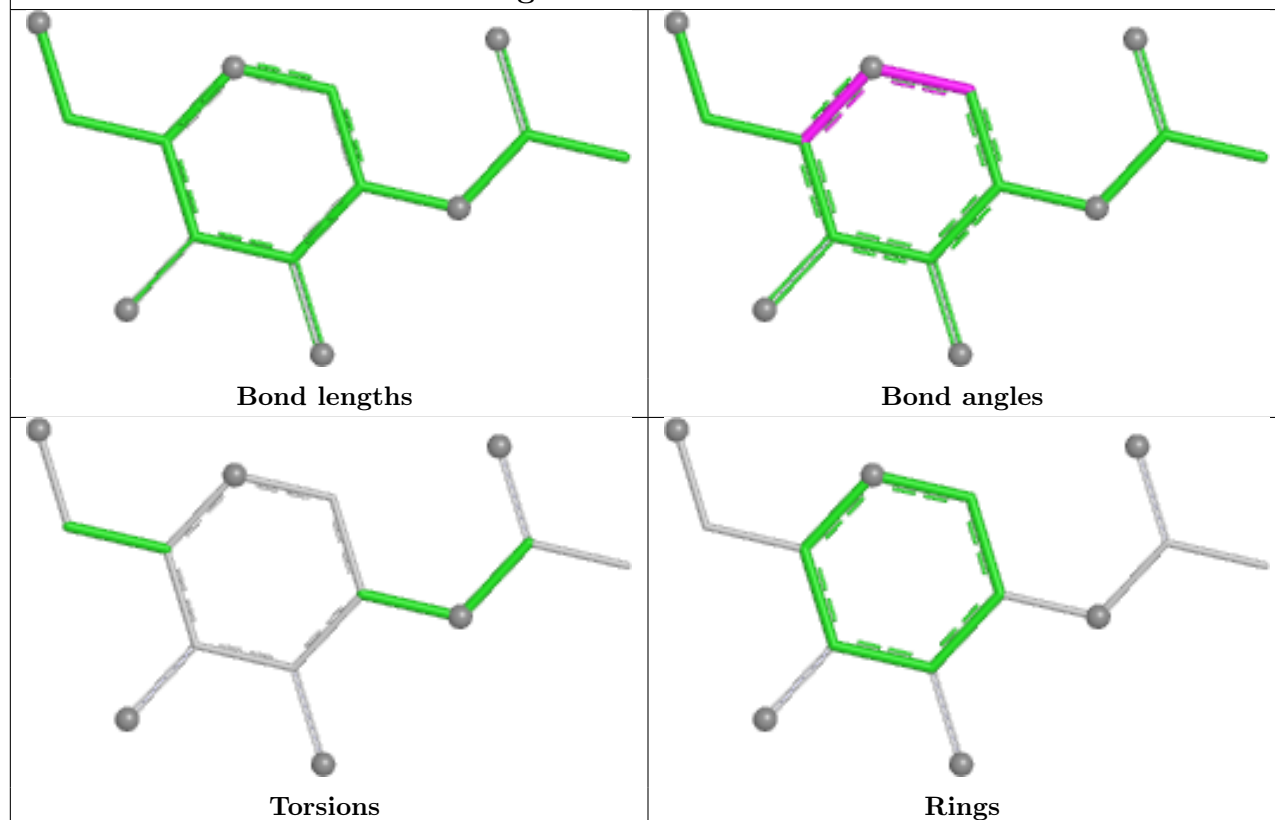
Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

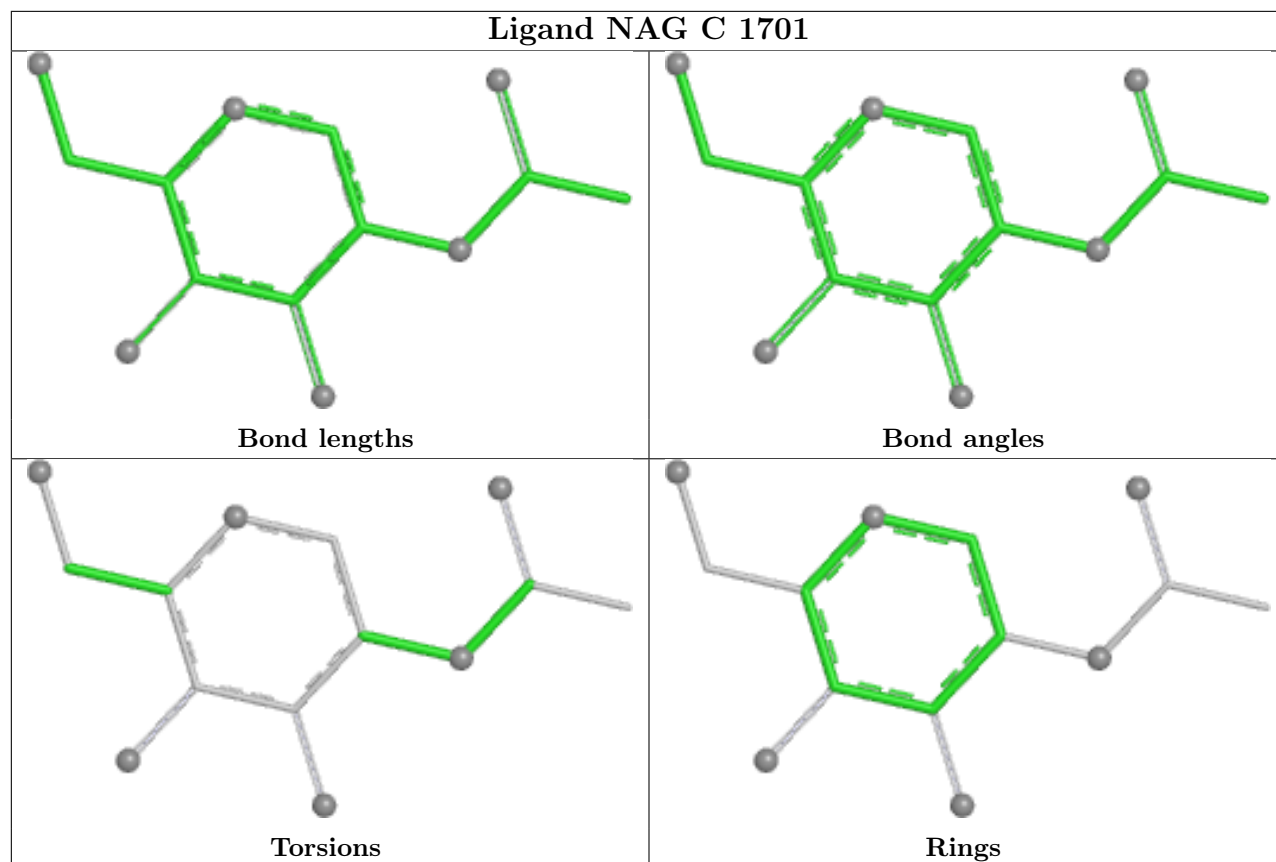


Ligand NAG K 1701



Ligand NAG G 1701





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

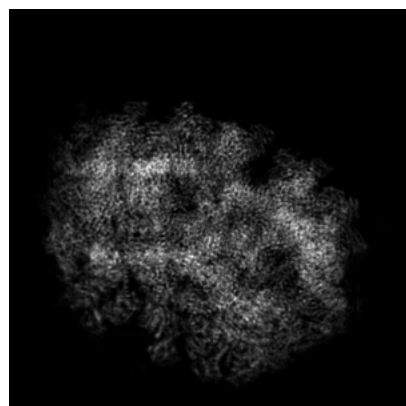
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-37980. These allow visual inspection of the internal detail of the map and identification of artifacts.

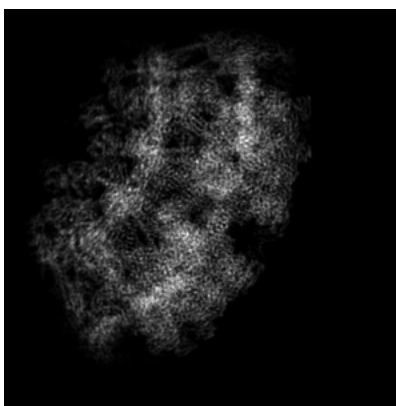
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

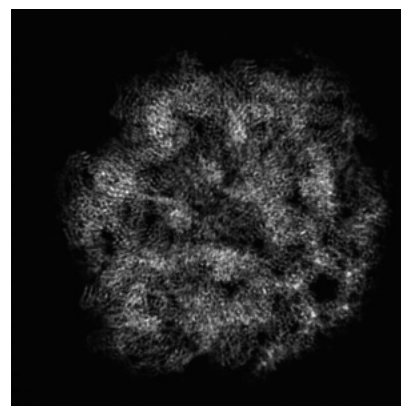
6.1.1 Primary map



X

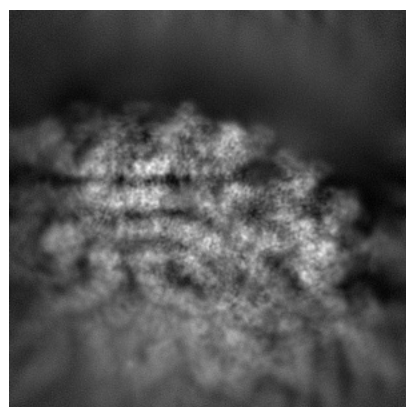


Y

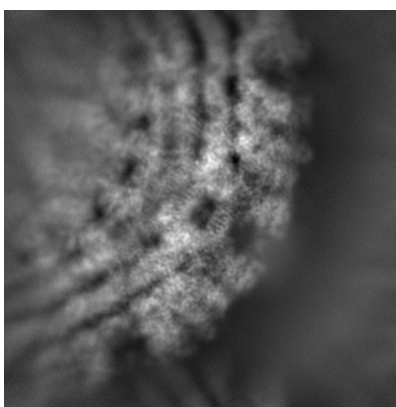


Z

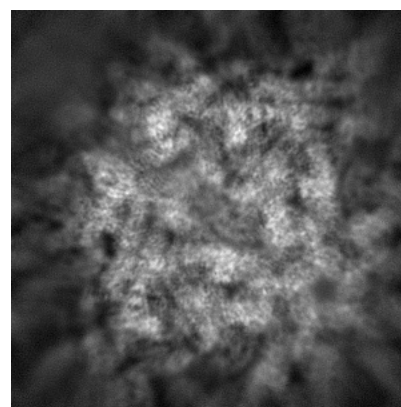
6.1.2 Raw map



X



Y

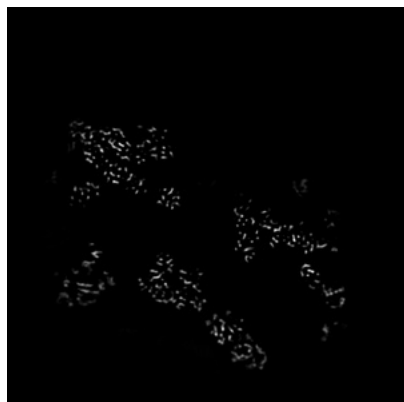


Z

The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

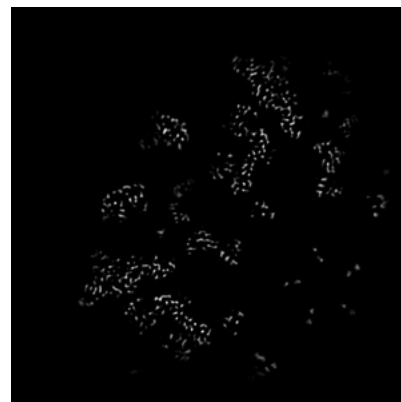
6.2.1 Primary map



X Index: 184

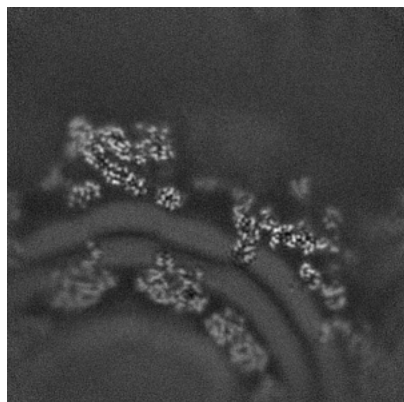


Y Index: 184

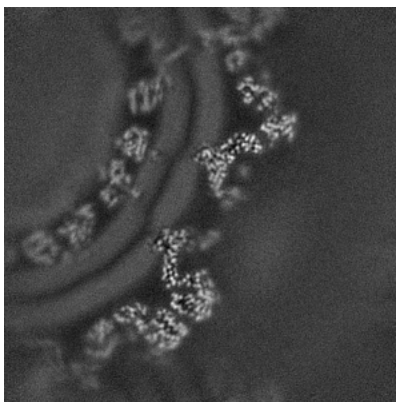


Z Index: 184

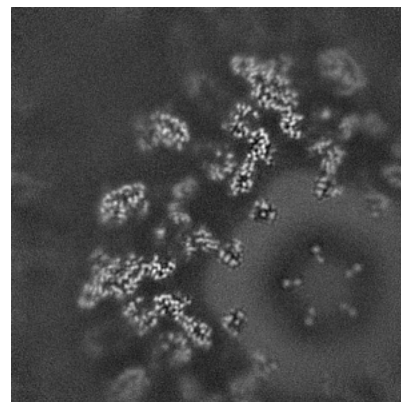
6.2.2 Raw map



X Index: 184



Y Index: 184



Z Index: 184

The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

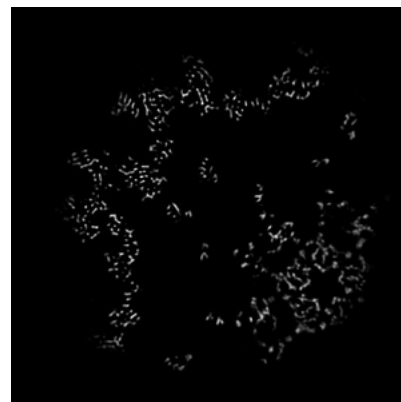
6.3.1 Primary map



X Index: 237

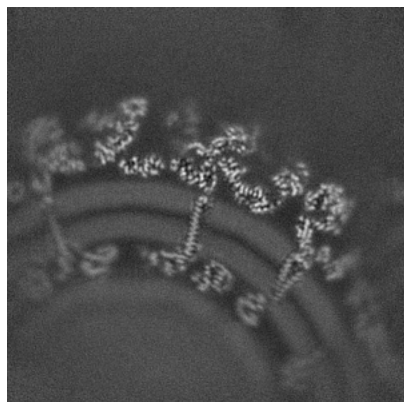


Y Index: 136

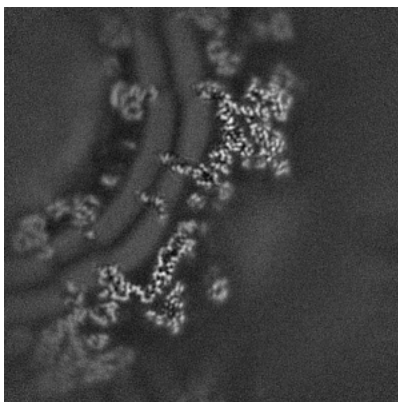


Z Index: 143

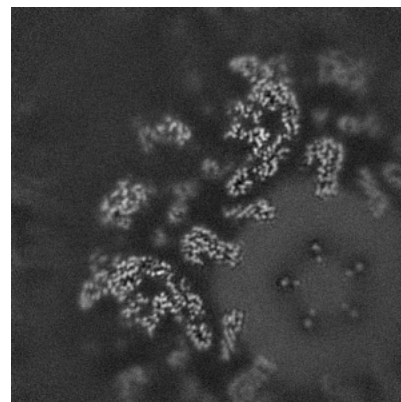
6.3.2 Raw map



X Index: 237



Y Index: 208

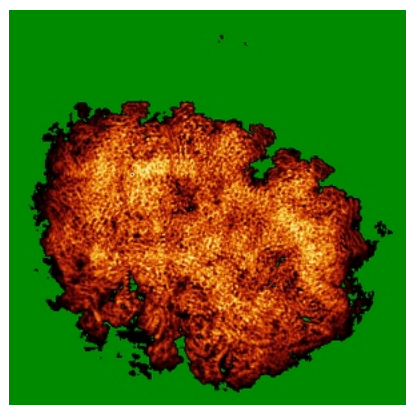


Z Index: 188

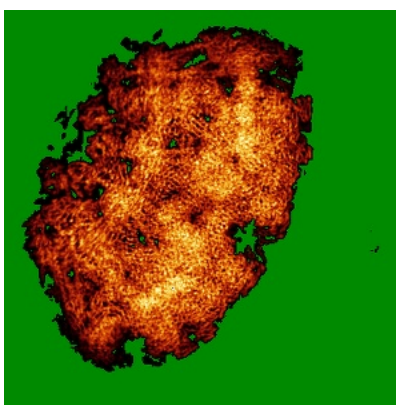
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

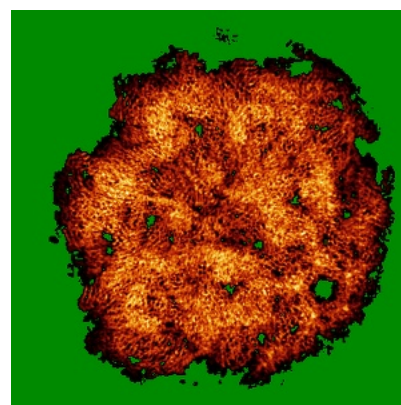
6.4.1 Primary map



X

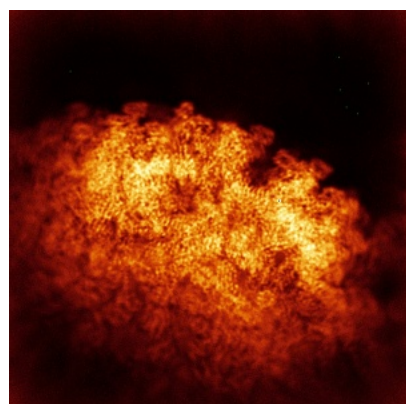


Y

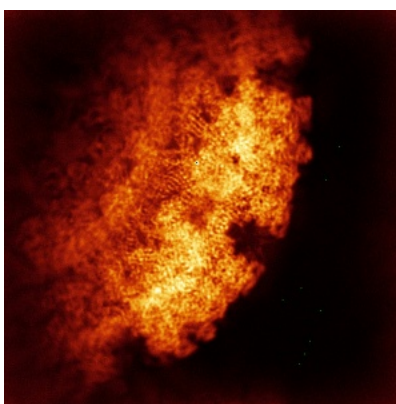


Z

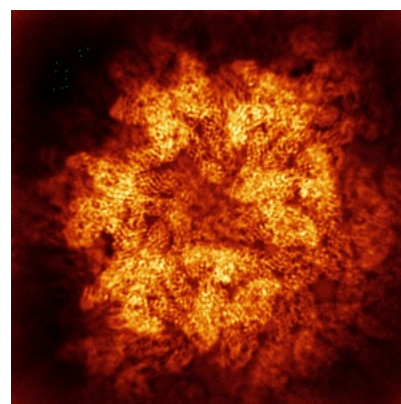
6.4.2 Raw map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

This section was not generated.

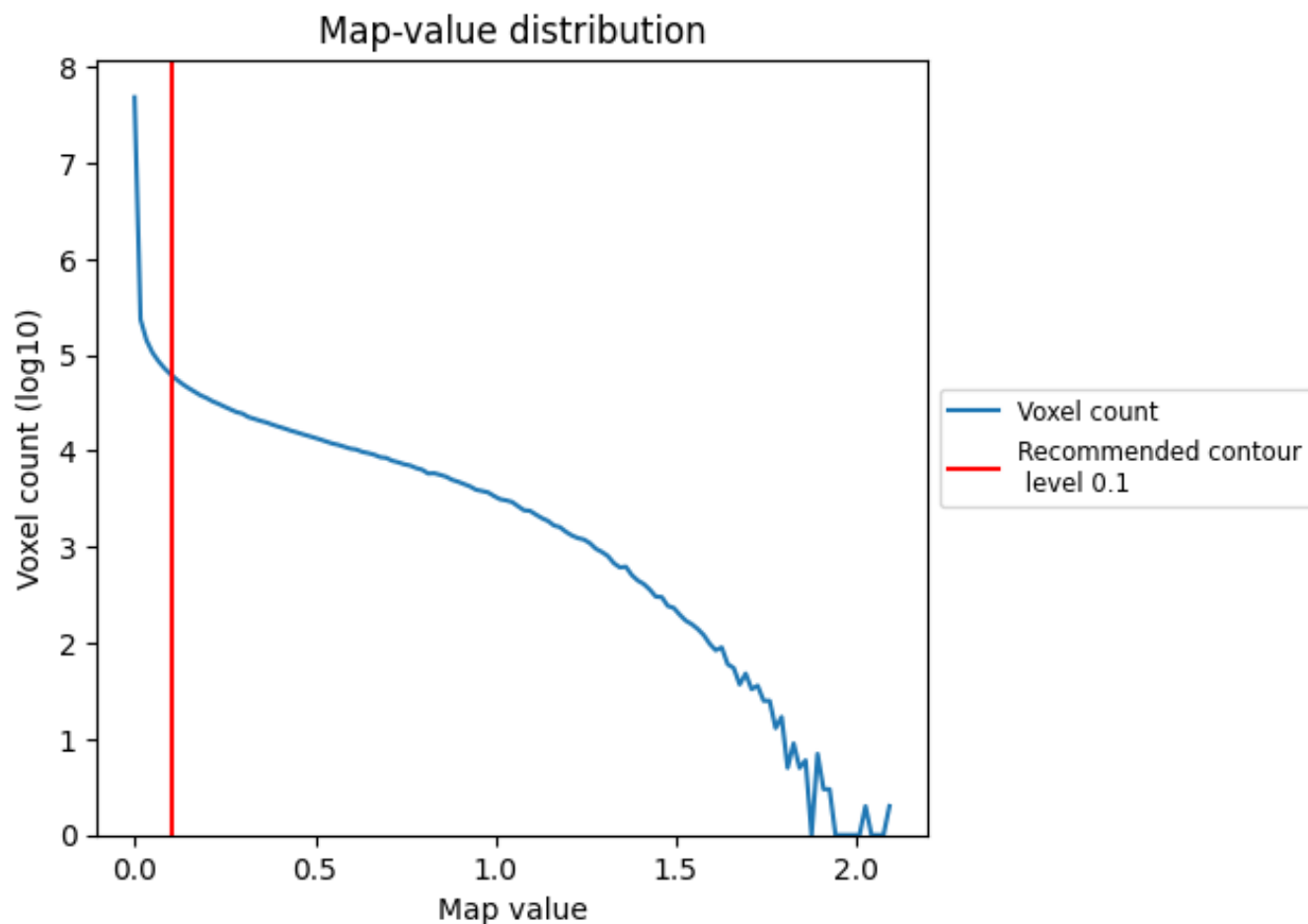
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

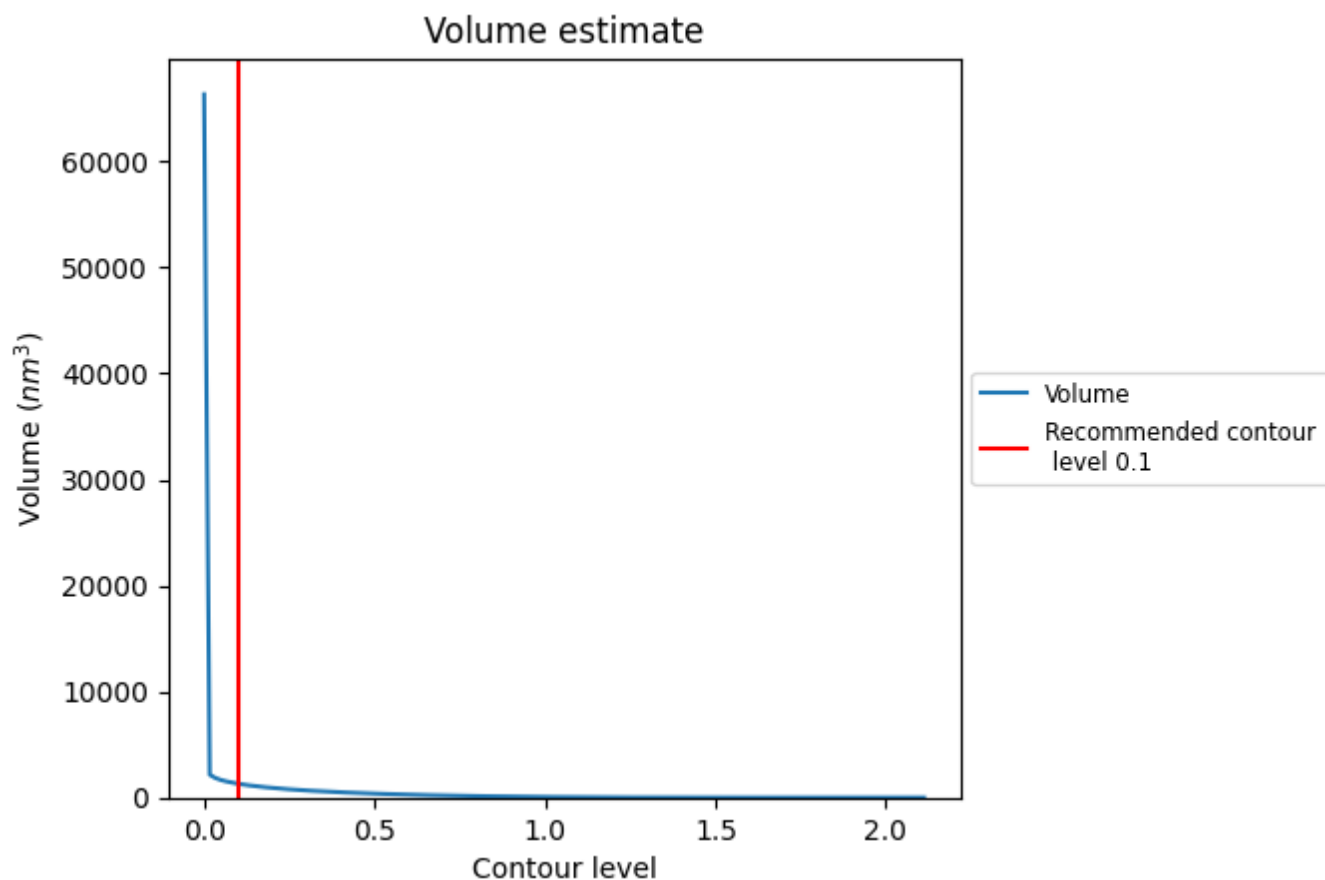
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

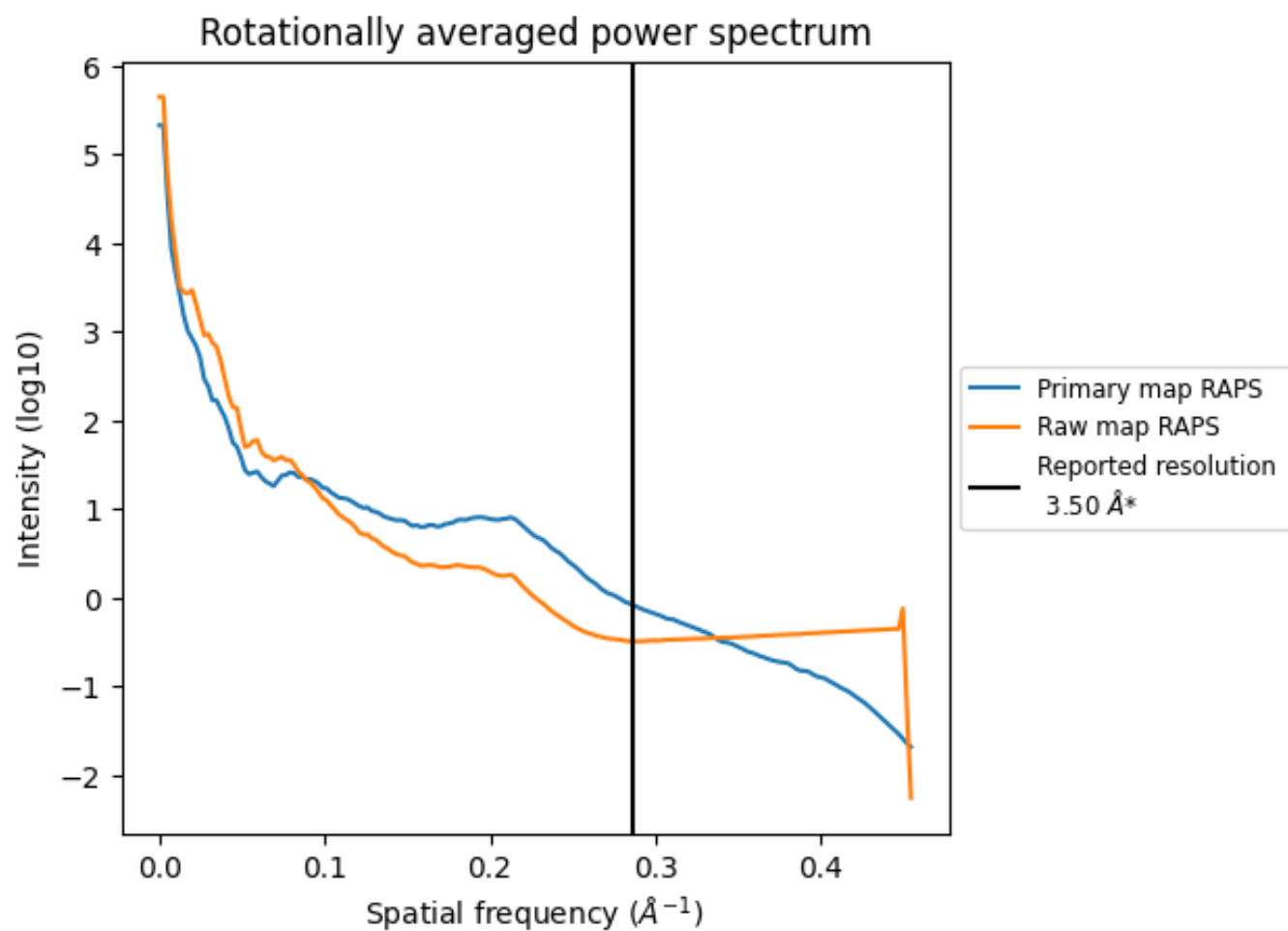
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1293 nm^3 ; this corresponds to an approximate mass of 1168 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

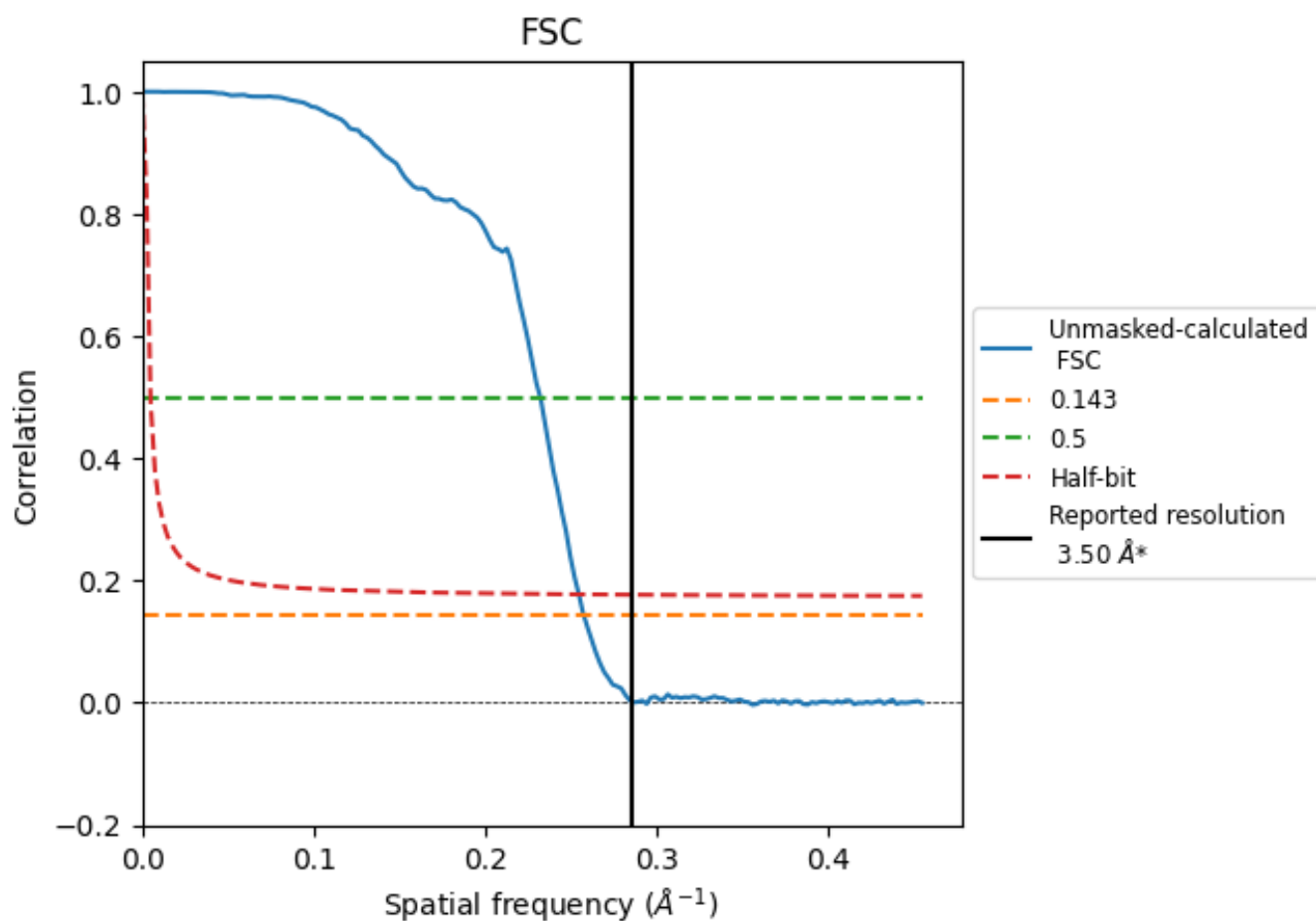


*Reported resolution corresponds to spatial frequency of 0.286 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.286 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

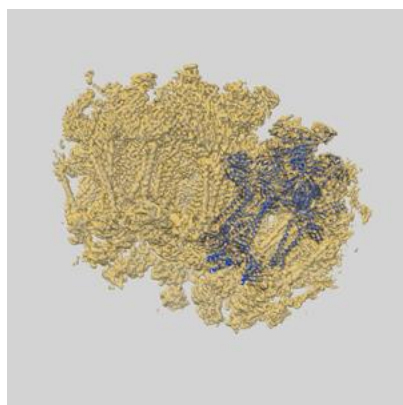
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.50	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.89	4.31	3.93

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.89 differs from the reported value 3.5 by more than 10 %

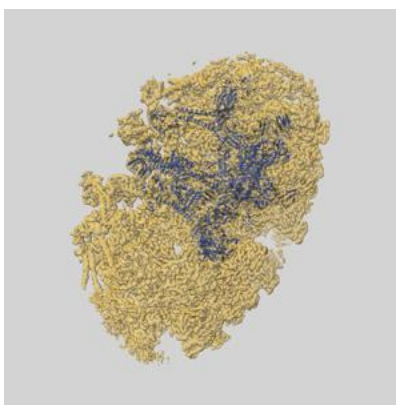
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-37980 and PDB model 8X0K. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

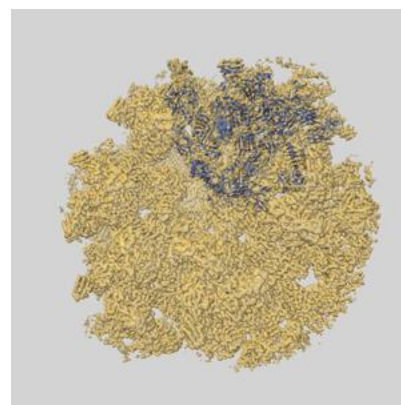
9.1 Map-model overlay [i](#)



X



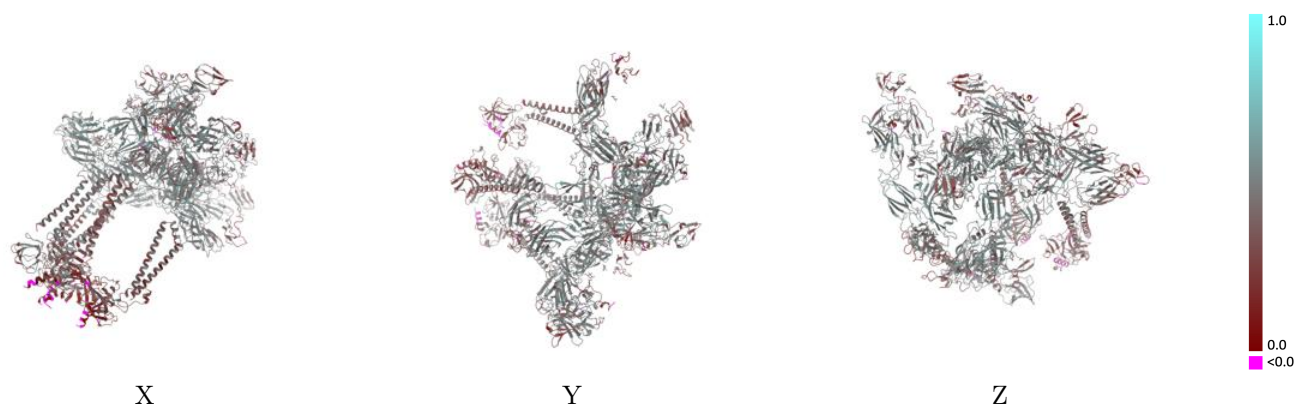
Y



Z

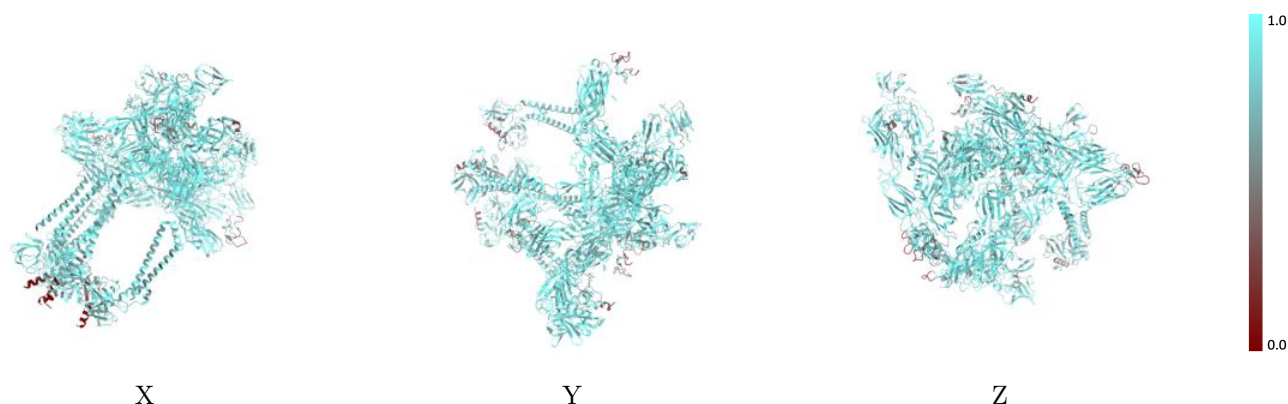
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



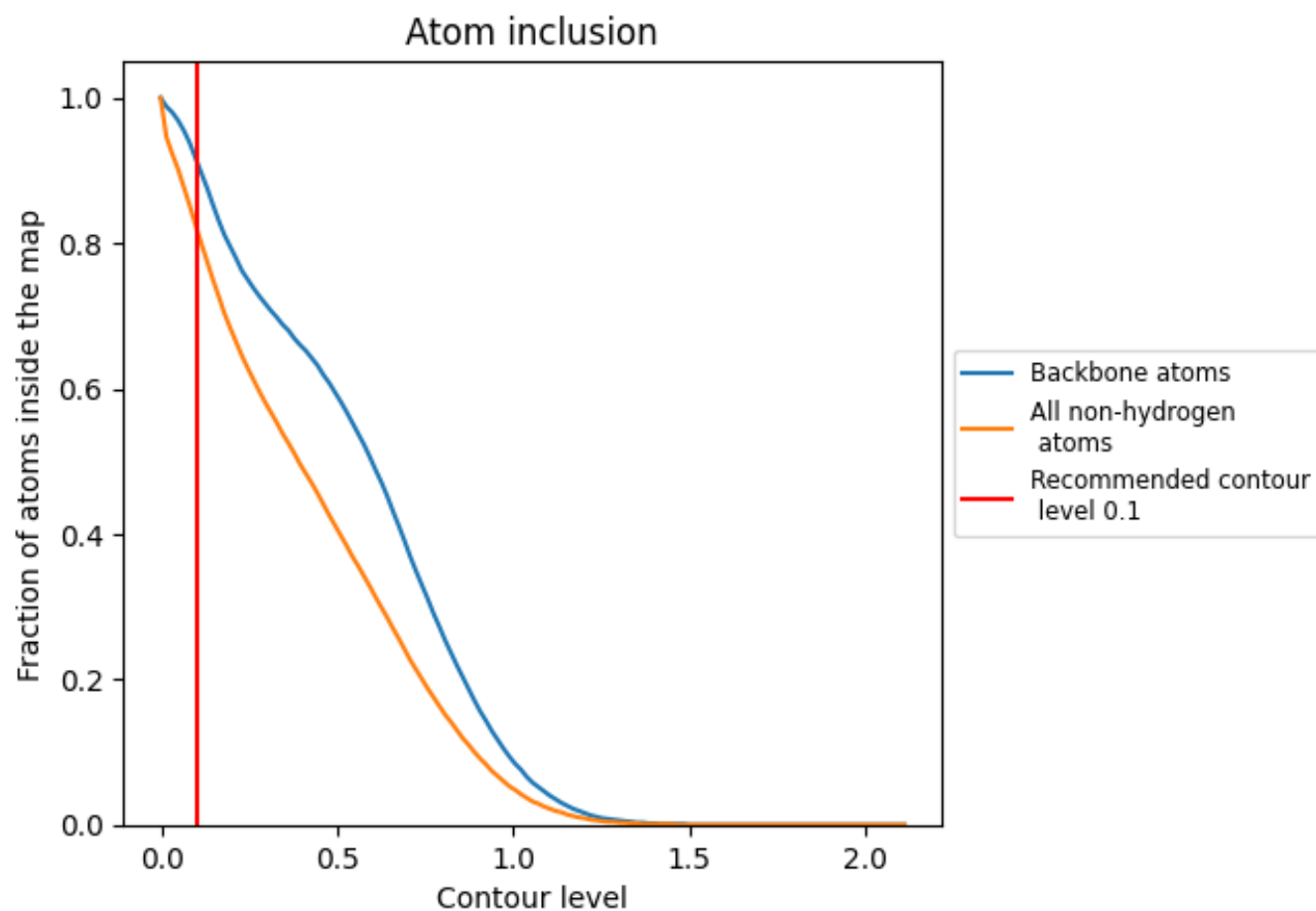
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.1).

9.4 Atom inclusion ⓘ



At the recommended contour level, 91% of all backbone atoms, 82% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8210	 0.4360
A	 0.7820	 0.3820
B	 0.8460	 0.4590
C	 0.8860	 0.4960
D	 0.5400	 0.2870
E	 0.6880	 0.2720
F	 0.8470	 0.4530
G	 0.8800	 0.4830
H	 0.4420	 0.2530
I	 0.6540	 0.2560
J	 0.8330	 0.4440
K	 0.8680	 0.4550
L	 0.3990	 0.2000
M	 0.7590	 0.3610
N	 0.8300	 0.4540
O	 0.8730	 0.4870
P	 0.2680	 0.2520
Q	 0.7860	 0.5000
R	 0.6430	 0.3170
S	 0.7860	 0.4590
T	 0.7140	 0.3470
U	 0.8210	 0.4670
V	 0.6790	 0.3120
W	 0.8570	 0.4650
X	 0.6430	 0.3630

